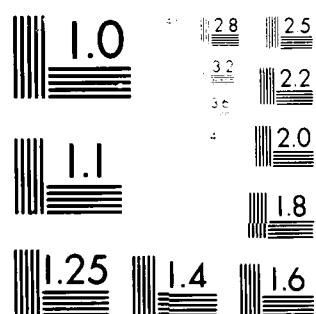


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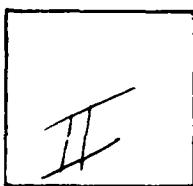


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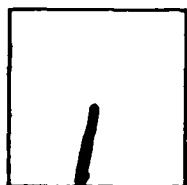
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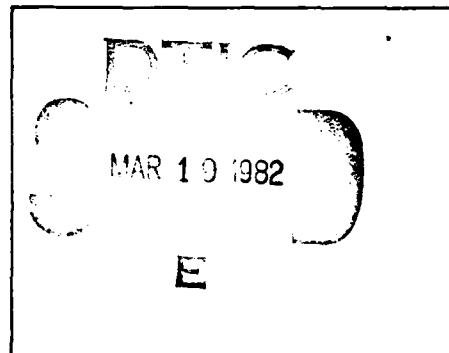
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MX SITING INVESTIGATION

GRAVITY SURVEY - SEVIER DESERT VALLEY

UTAH

Prepared for:

U.S. Department of the Air Force  
Ballistic Missile Office (BMO)  
Norton Air Force Base, California 92409

Prepared by:

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3777 Long Beach Boulevard  
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24 January 1981

FUGRO NATIONAL INC.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) <u>Results of the gravity survey in the Sevier Desert Valley</u> <u>in West Central Utah</u> <del>show</del> <u>indicate</u> <u>the presence</u> <u>that the</u> <u>minimum in the central part of the study area overlie</u> <u>an</u> <u>interbedded</u> <u>with a thick sequence of dense</u> <u>basalt</u> <u>and that</u> <u>the basalt is about 2000 ft</u> <u>the area of the survey</u> <u>where</u> <u>the minimum is interpreted to be about 1000 ft</u> <u>thick</u> <u>the basalt in the central part of the area may make the location of a</u>		

## FOREWORD

Methodology and Characterization studies during Fiscal Years 1977 and 1978 (FY 77 and 78) included gravity surveys in ten valleys in Arizona (five), Nevada (two), New Mexico (two), and California (one). The gravity data were obtained for the purpose of estimating the gross structure and shape of the basins and the thickness of the valley fill. There was also the possibility of detecting shallow rock in areas between boring locations. Generalized interpretations from these surveys were included in Fugro National's Characterization Reports (FN-TR-26a through e).

During the FY 77 surveys, measurements were made to form an approximate 1-mile grid over the study areas and contour maps showing interpreted depth to bedrock were made. In FY 79, the decision was made to concentrate on verifying and refining suitable area boundaries. This decision resulted in a reduction in the gravity program. Instead of obtaining gravity data on a grid, the reduced program consisted of obtaining gravity measurements along profiles across the valleys where Verification studies were also performed.

The Defense Mapping Agency (DMA), St. Louis was requested to provide gravity data from its library to supplement the gravity profiles. For Big Smoky, Hot Creek, and Big Sand Springs valleys, a sufficient density of library data was available to permit construction of interpreted contour maps instead of just two-dimensional cross sections.

In late summer of FY 79, supplementary funds became available to begin data reduction. At that time, inner zone terrain corrections were begun on the library data and the profiles from Big Smoky Valley, Nevada, and Butler and La Posa valleys, Arizona. The profile data from Whirlwind, Hamlin, Snake East, White River, Garden and Coal valleys, Nevada, became available from the field in early October 1979.

A continuation of gravity interpretations has been incorporated into the FY 80 program, and the results are being summarized in a series of valley reports. Reports covering Nevada-Utah gravity studies will be numbered, "FN-TR-33-", followed by the abbreviation for the subject valley. In addition, more detailed reports of the results of FY 77 surveys in Dry Lake and Ralston valleys, Nevada, were prepared. Verification studies continued in FY 80, and gravity studies are included in the program. DMA will continue to obtain the field measurements, and there was a return to the grid pattern. The interpretation of the grid data allows the production of contour maps which will be valuable in the deep basin structural analysis needed for computer

modeling in the water resources program. The gravity interpretations will also be useful in Nuclear Hardness and Survivability (NH&S) evaluations.

The basic decisions governing the gravity program are made by BMO following consultation with TRW, Inc., Fugro National, and the DMA. Conduct of the gravity studies is a joint effort between DMA and Fugro National. The field work, including planning, logistics, surveying, and meter operation is done by the Defense Mapping Agency Hydrographic/Topographic Center (DMAHTC), headquartered in Cheyenne, Wyoming. DMAHTC reduces the data to Simple Bouguer Anomaly (see Section A1.4, Appendix A1.0). The Defense Mapping Agency Aerospace Center (DMAAC), St. Louis, calculates outer zone terrain corrections.

Fugro National provides DMA with schedules showing the valleys with the highest priorities. Fugro National also recommended locations for the profiles in the FY 79 studies with the constraints that they should follow existing roads or trails. Any required inner zone terrain corrections are calculated by Fugro National prior to making geologic interpretations.

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2      Interpreted Depth to Bed Rock Map                      Section

## 1.0 INTRODUCTION

### 1.1 Objective

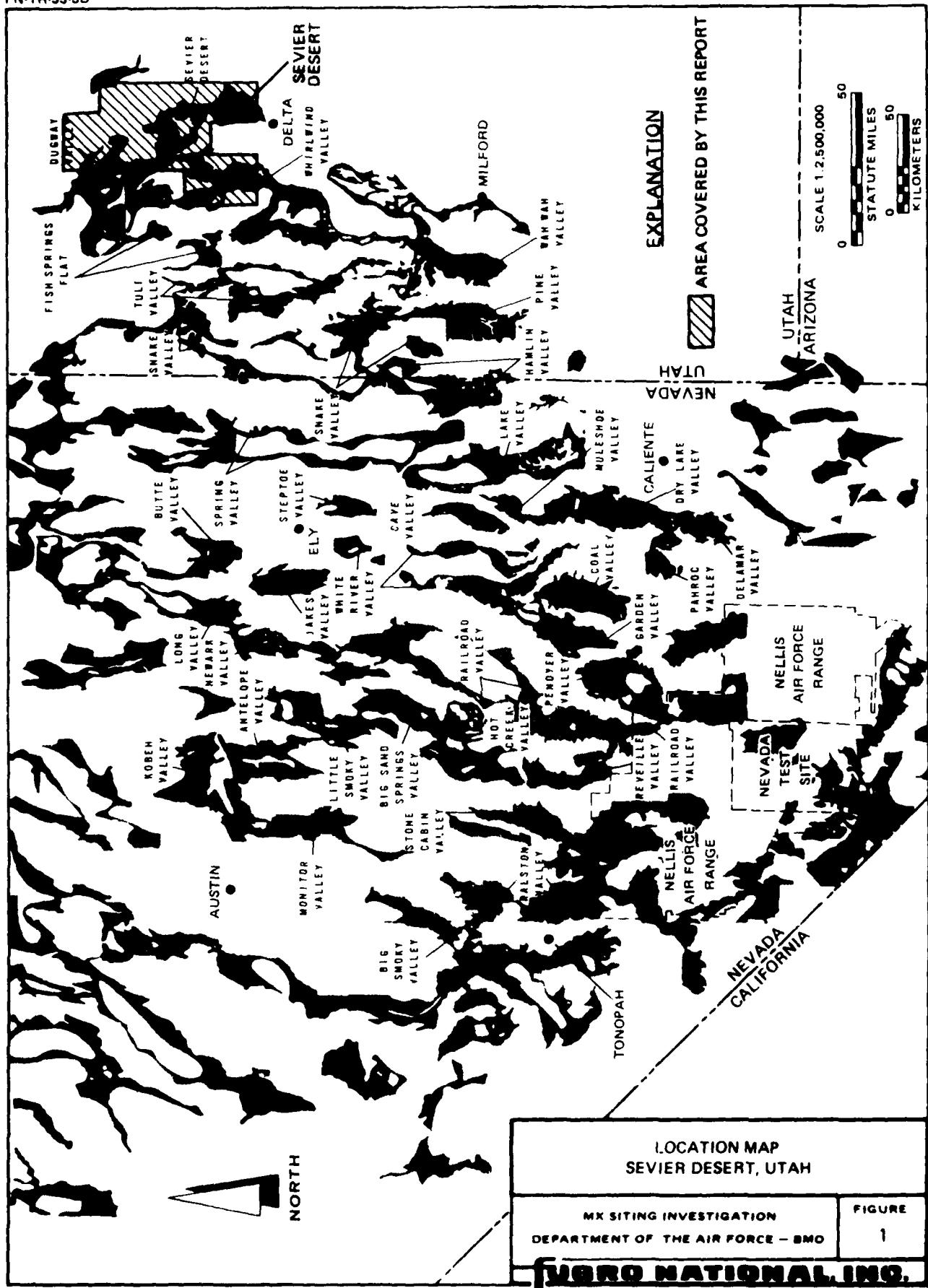
Gravity measurements were made in Sevier Desert Valley for the purpose of estimating the overall shape of the structural basin, the thickness of alluvial fill, and the location of concealed faults. The estimates will be useful in modeling the dynamic response of ground motion in the basin and evaluating ground-water resources.

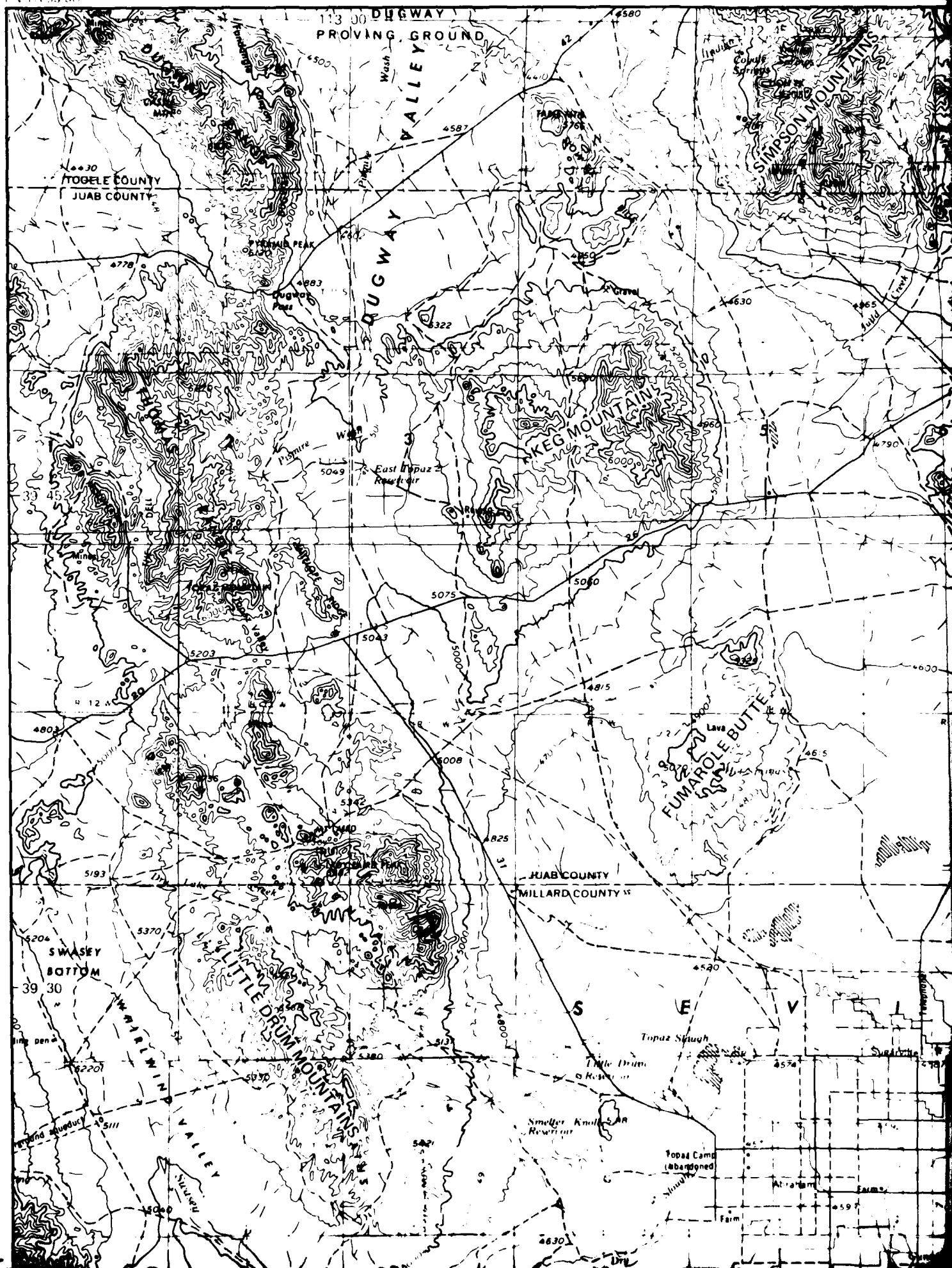
### 1.2 Location

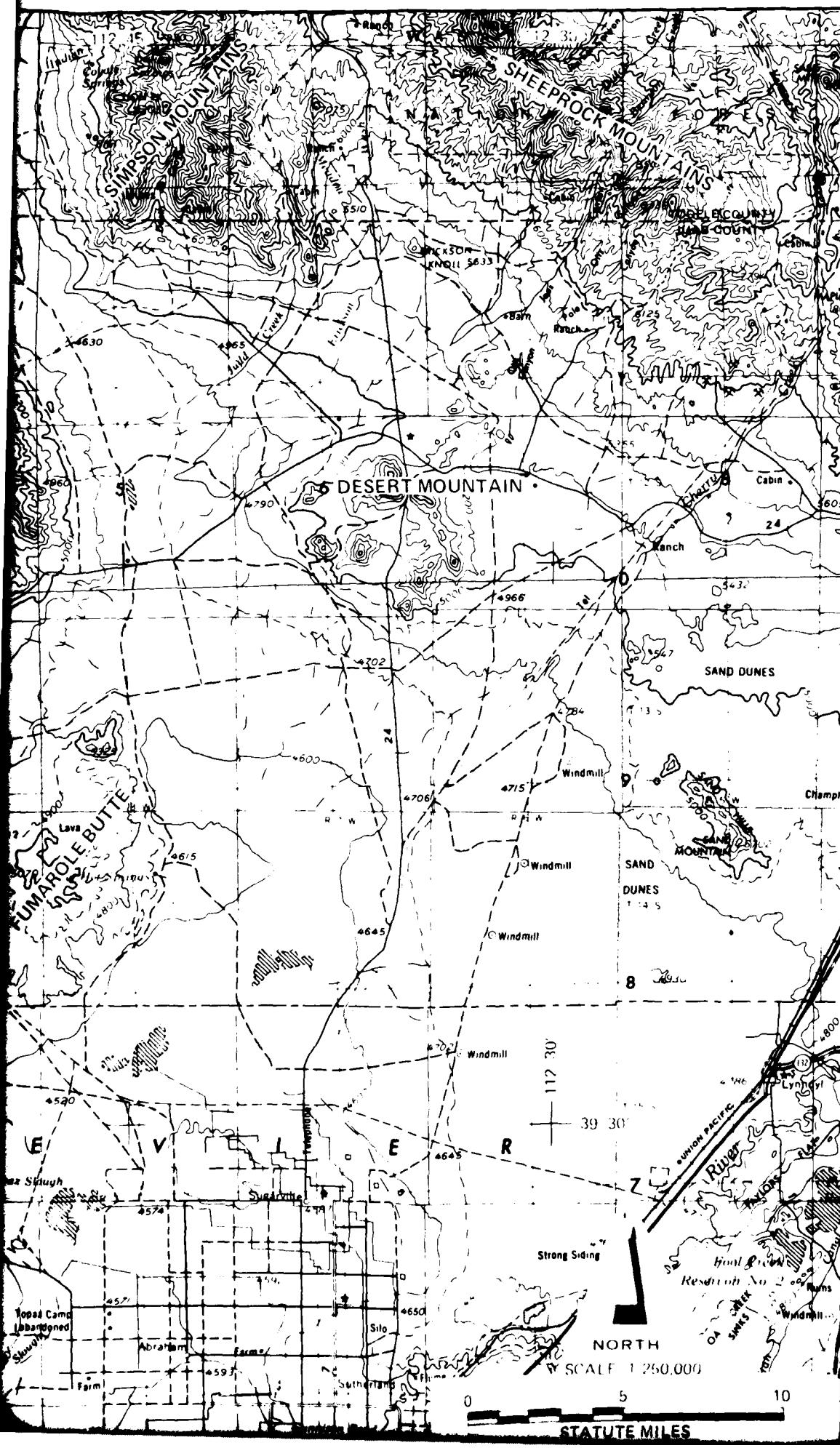
Sevier Desert is located (see Figure 1) in west central Utah in Tooele, Juab, and Millard counties. It is north of Sevier Lake; its center lying approximately 20 miles north of Delta, Utah. Sevier Desert is a broad, irregularly shaped valley. The part of the valley covered by this report is bounded (Figure 2) on the north by Dugway Proving Ground, Sheeprock Mountain, and Simpson Mountains, to the east by Gilson Mountain, to the west by Dugway Valley and the McDowell Mountains (Keg Mountain), and to the south by Whirlwind Valley and the inhabited area surrounding Delta, Utah. Access is fair along a system of unmaintained roads as well as U.S. Highway 50 which cuts across the southeast corner of the area. Most of the valley is undeveloped rangeland.

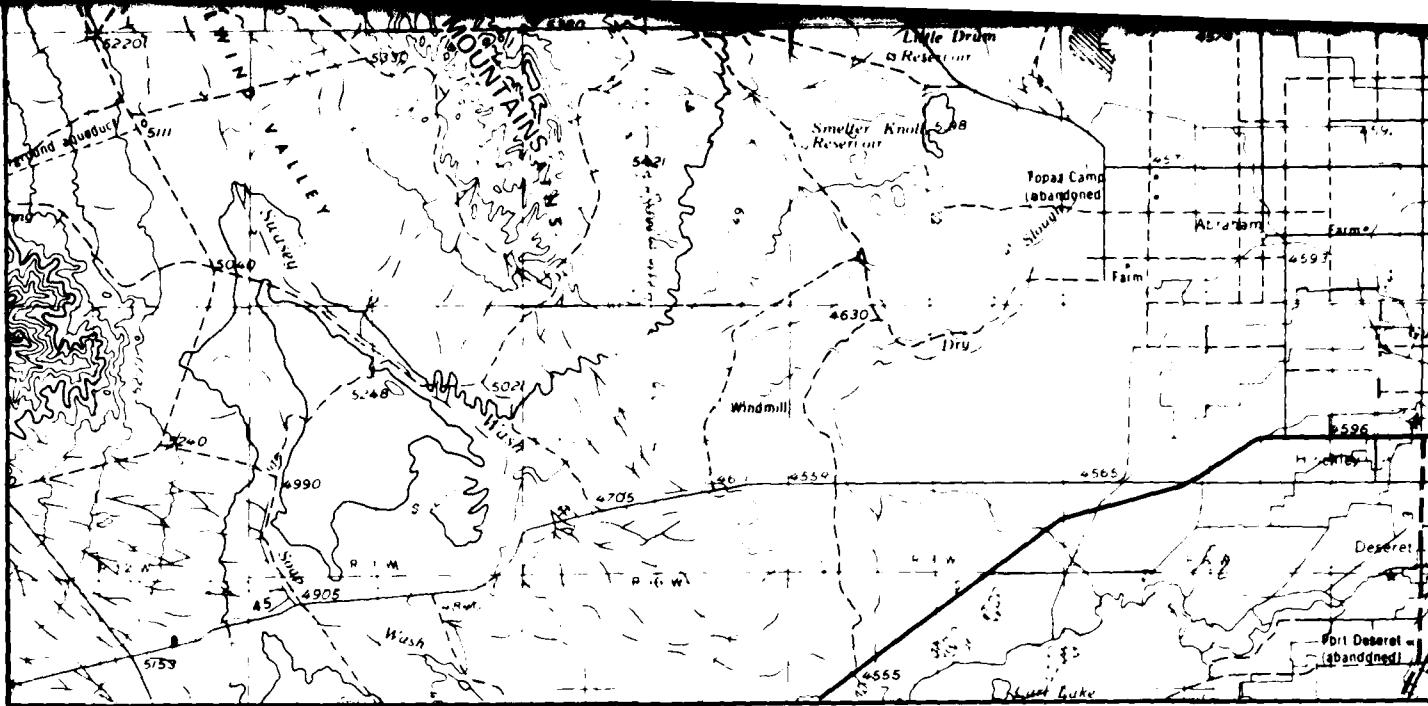
### 1.3 Scope of Work

Gravity measurements were made by the Defense Mapping Agency Hydrographic-Topographic Center/Geodetic Survey Squadron (DMA HTC/GSS).



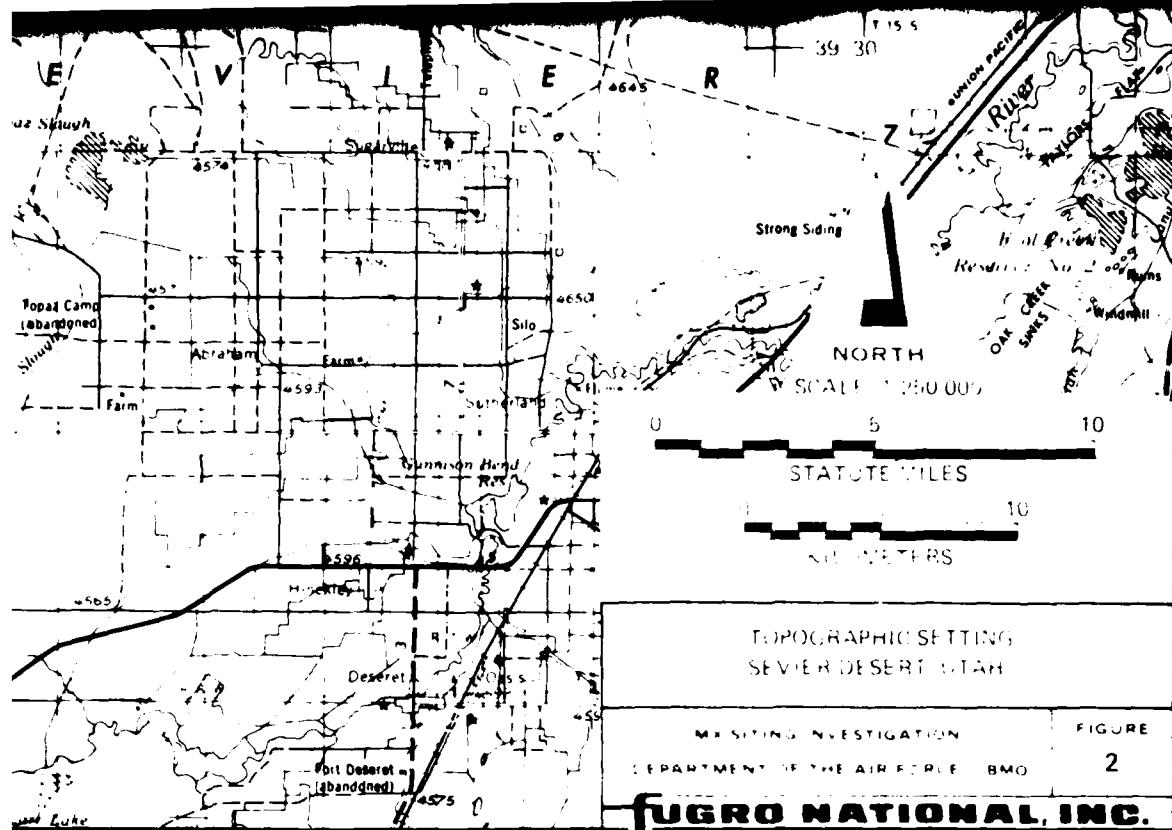






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## TOPOGRAPHIC SETTING SEVIER DESERT, UTAH

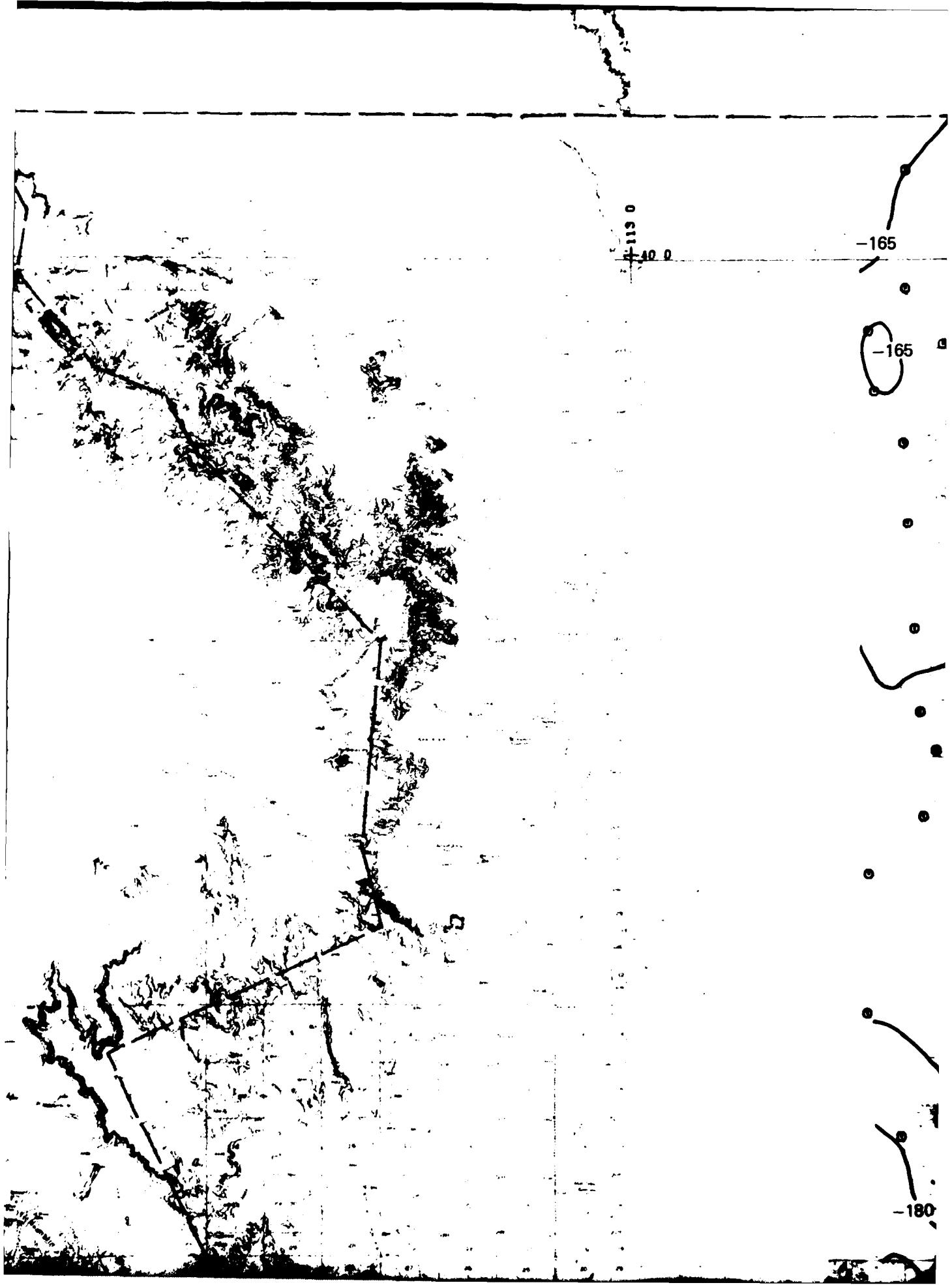
MISSING INVESTIGATION  
DEPARTMENT OF THE AIR FORCE BMO FIGURE 2

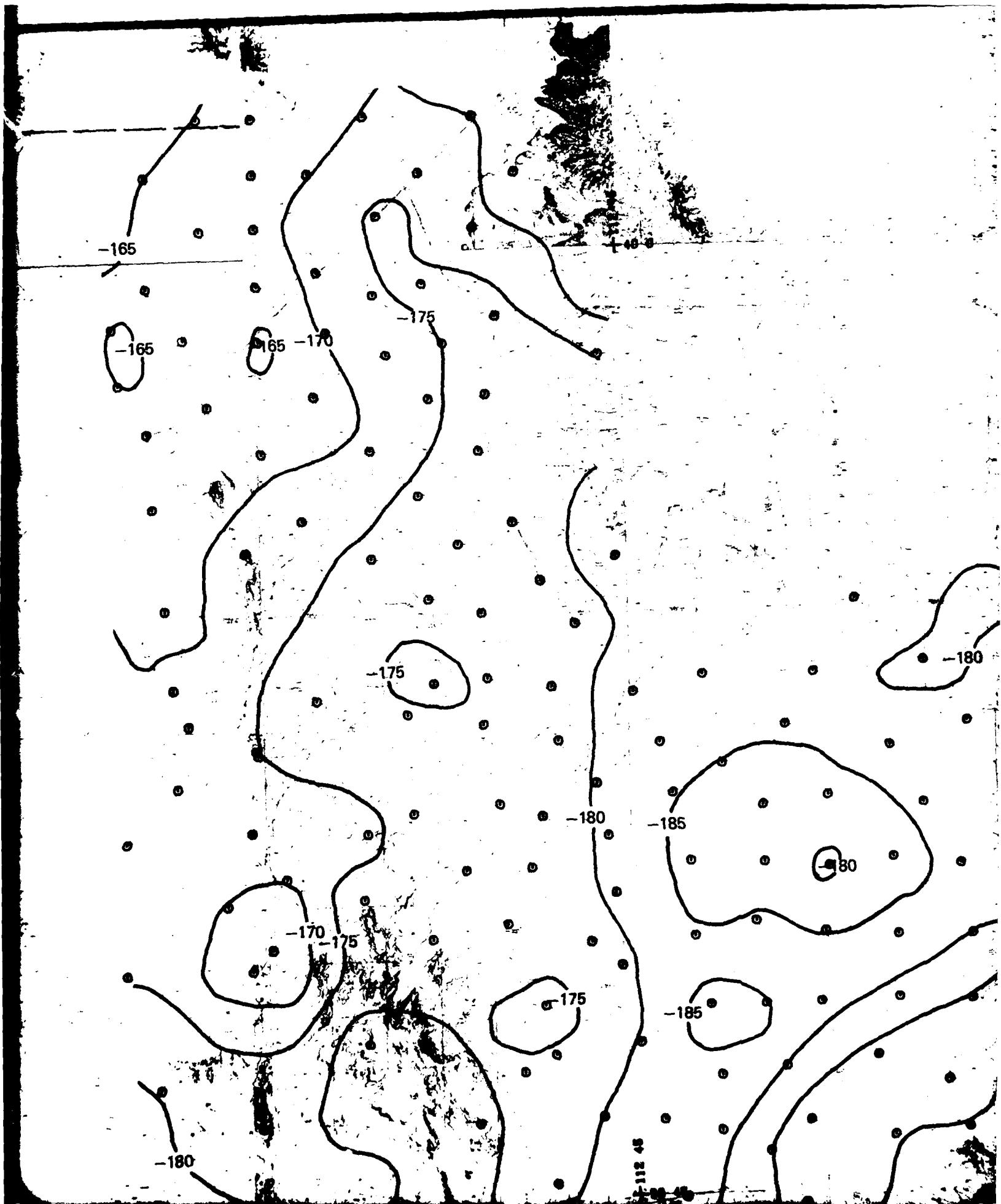
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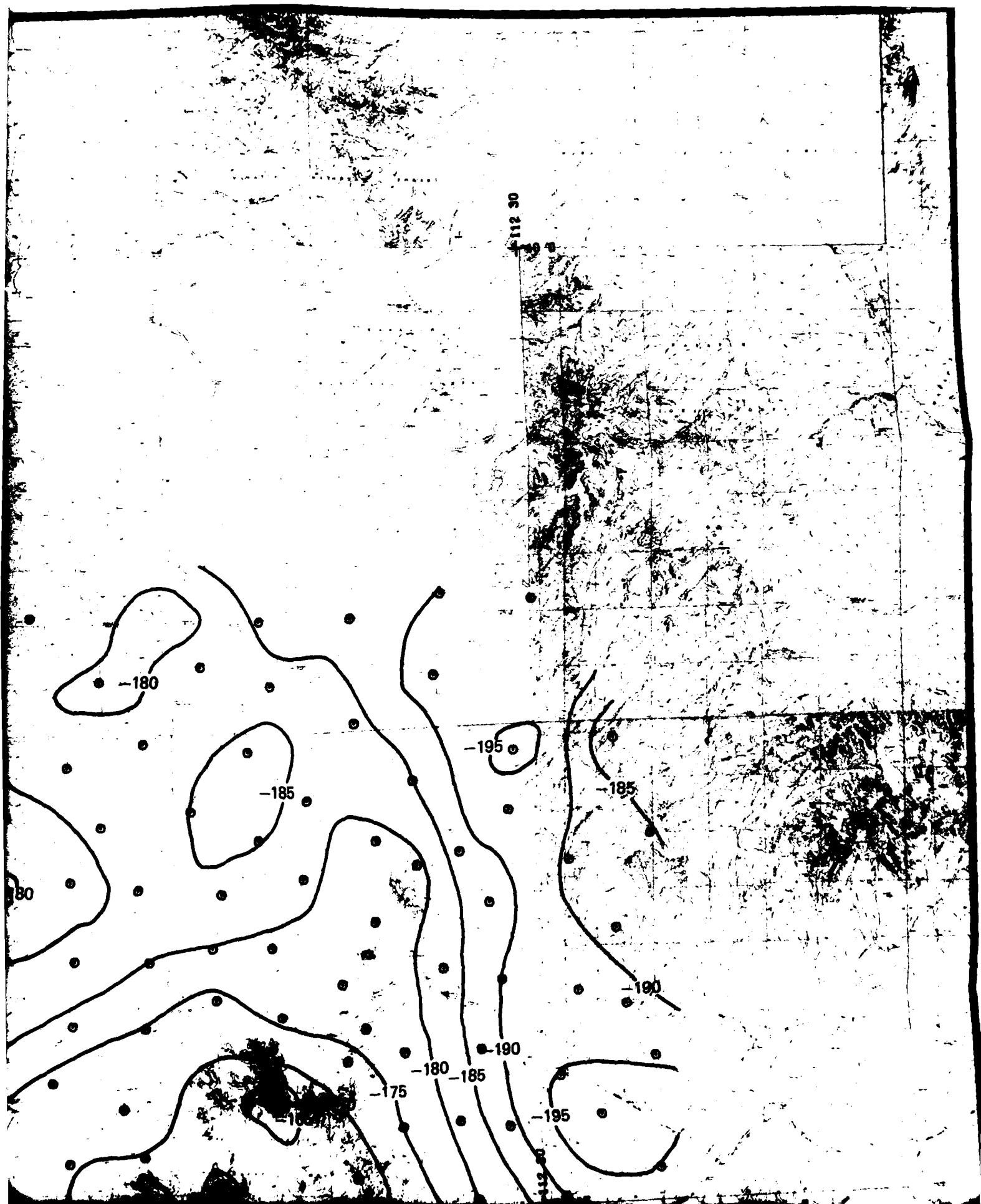
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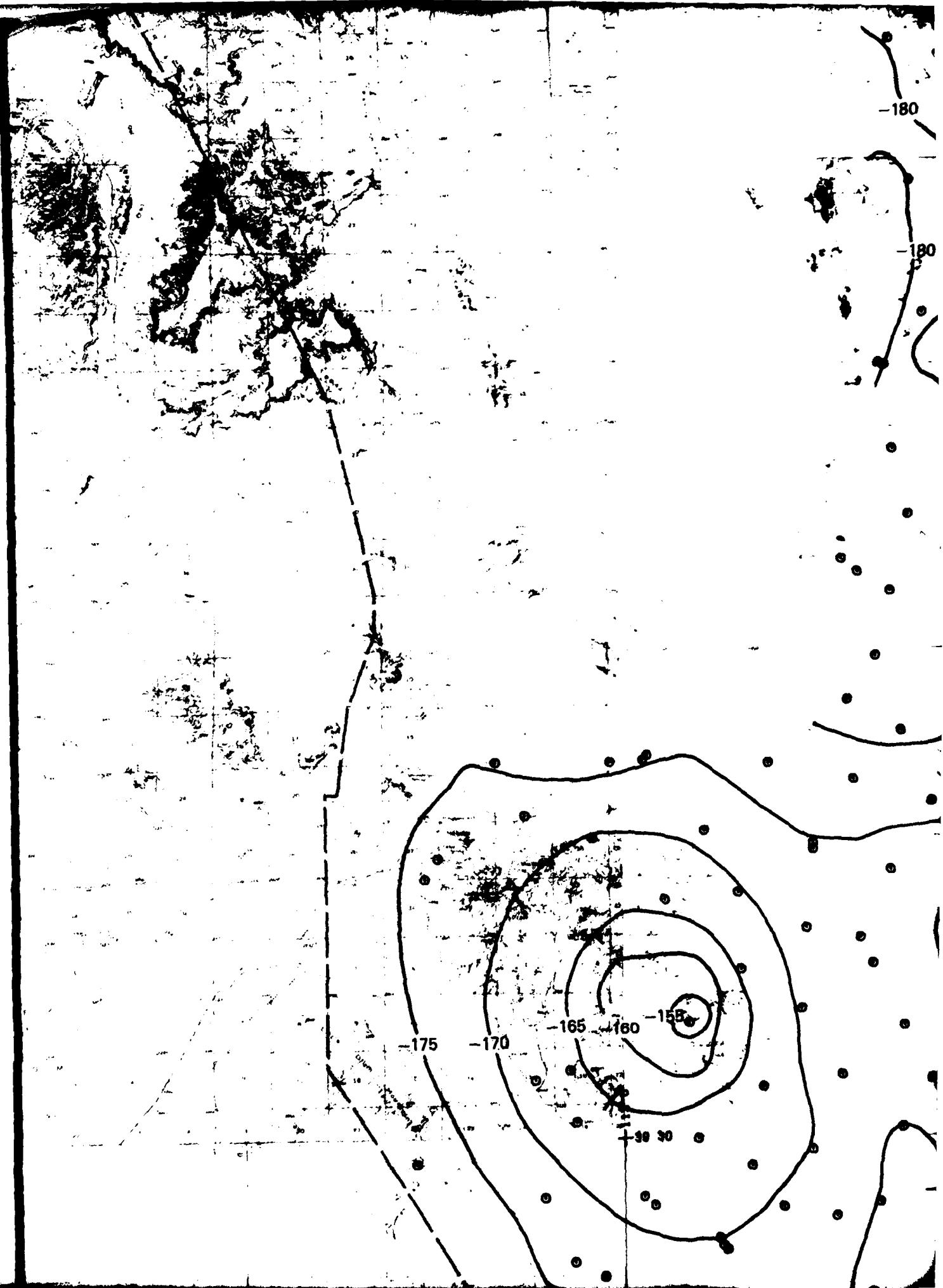
Dugway and Sevier Desert valleys were studied together, but the results are presented in separate reports. The region containing both valleys lies between latitudes  $39^{\circ}30'$  and  $40^{\circ}05'$  and between longitudes  $112^{\circ}15'$  and  $113^{\circ}00'$ . There are 879 gravity stations in this region. The stations on bedrock were used to establish a common regional gravity trend for the two valleys. For the purpose of this report, Sevier Desert Valley is the area bounded by latitudes  $39^{\circ}20'$  and  $40^{\circ}00'$  and by longitudes  $112^{\circ}30'$  and  $112^{\circ}55'$  (Figure 2). The area is approximately 50 miles (80 km) long and 30 miles (48 km) wide. The gravity stations were distributed throughout the valley at an approximate interval of 1.4 miles (2.3 km). Drawing 1 is a Complete Bouguer Anomaly (CBA) and gravity station map.

Station elevations were established within a tolerance of 5 feet (1.5 m). This tolerance limits the gravity precision to 0.3 milligals.

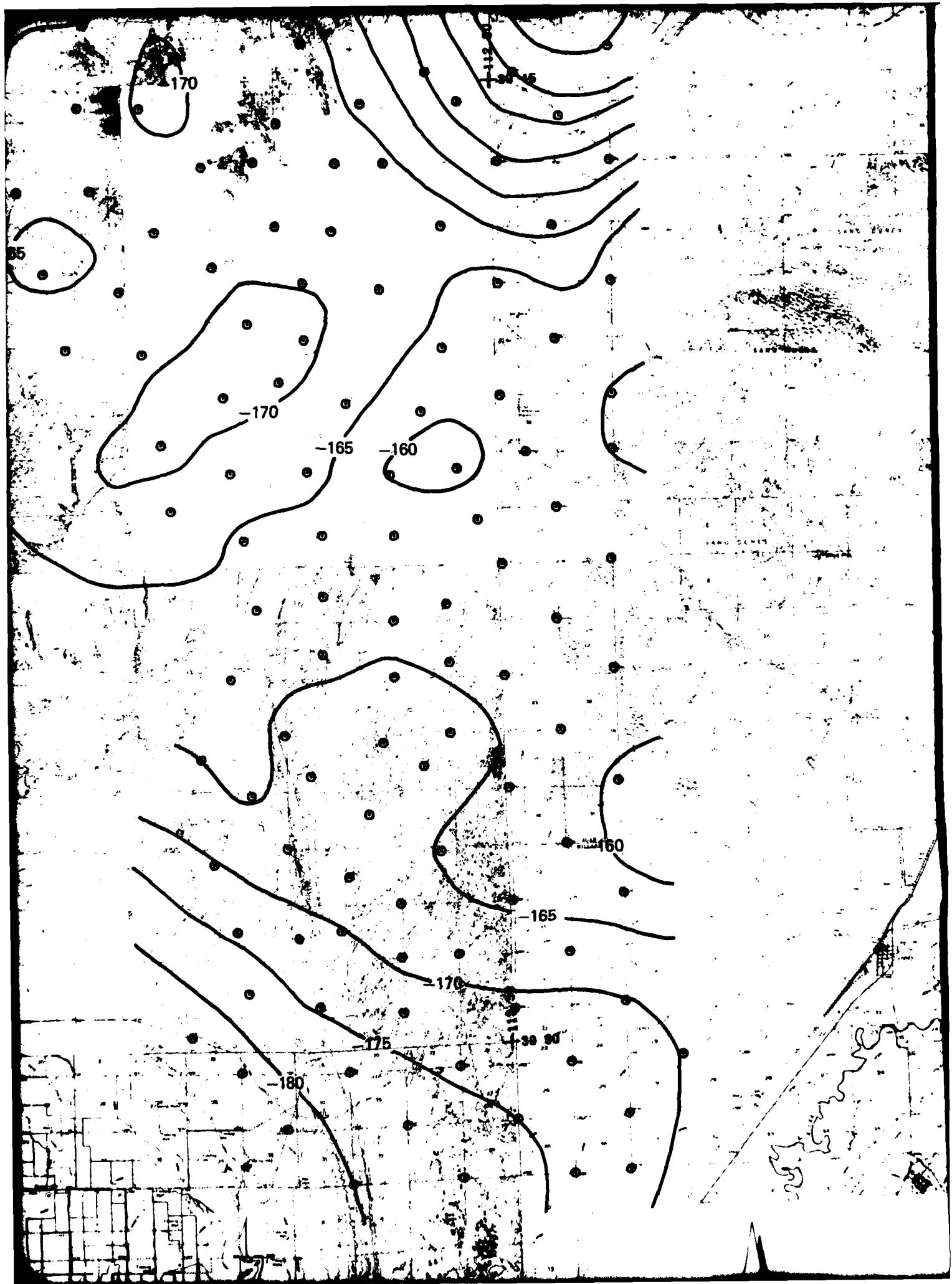




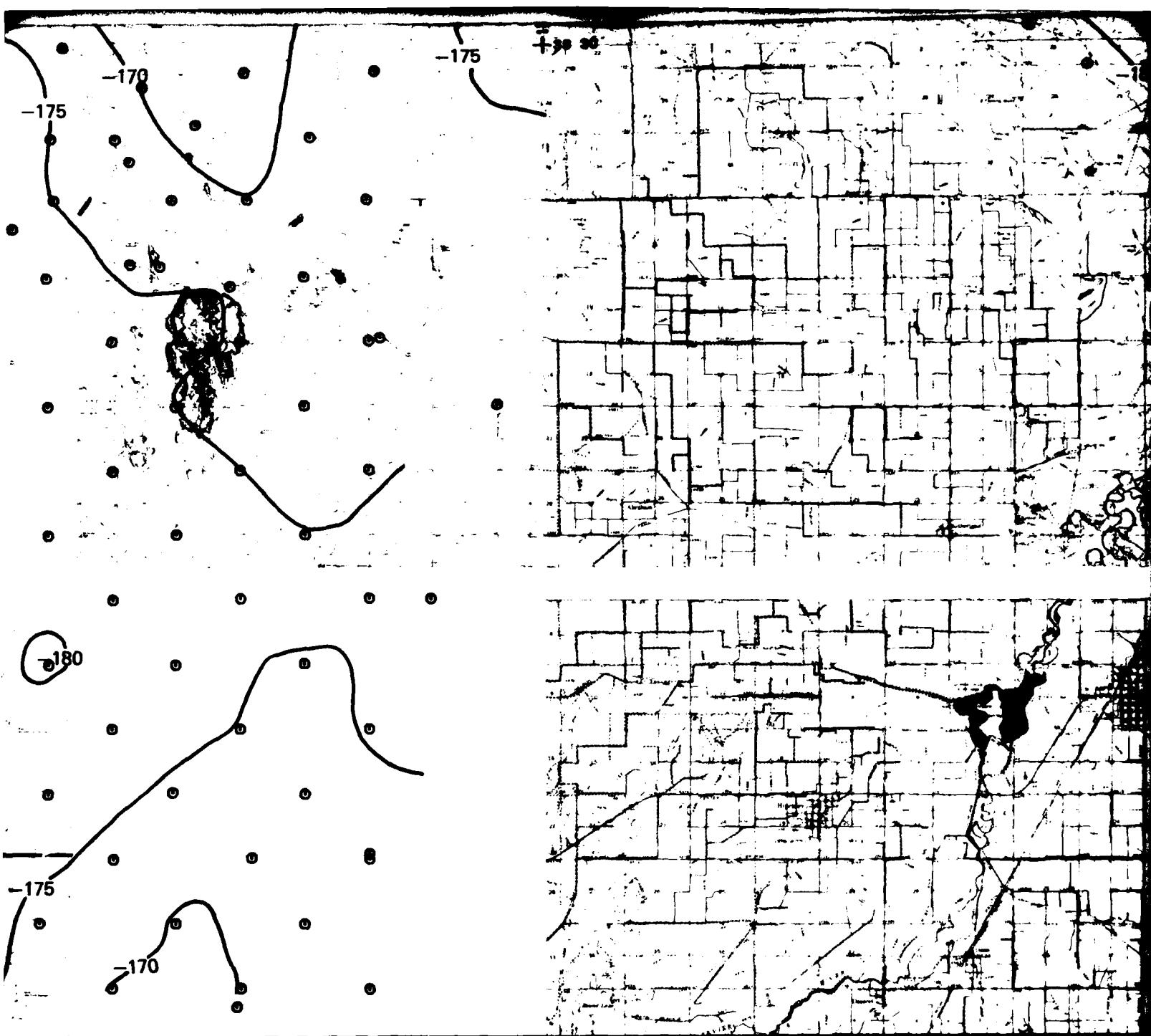


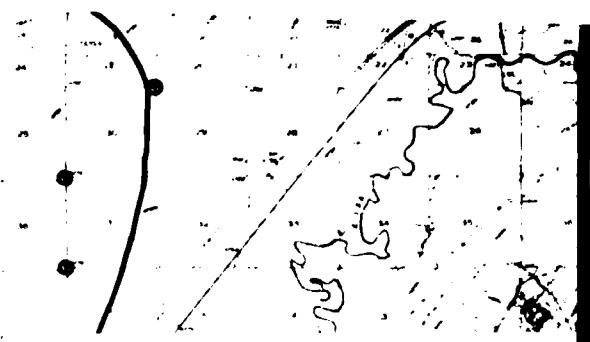
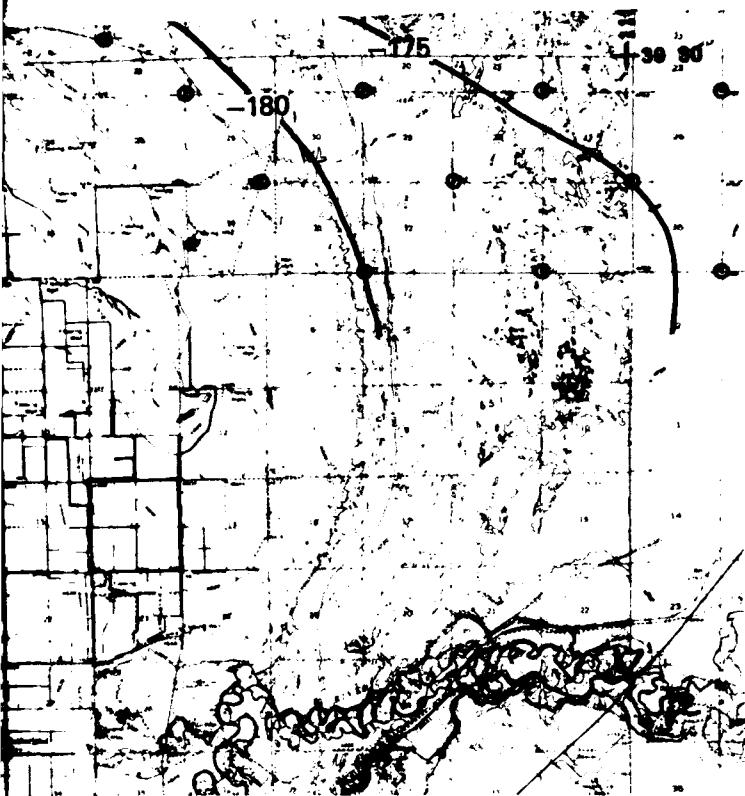












NORTH

SCALE 1: 125,000

0 2 4  
STATUTE MILES  
0 2 4  
KILOMETERS

EXPLANATION

● GRAVITY FIELD STATIONS

— 175 — CBA GRAVITY CONTOURS

CONTOUR INTERVAL = 5 MILLIGALS

COMPLETE BOUGUER ANOMALY CONTOURS  
SEVIER DESERT, UTAH

MX SITING INVESTIGATION DEPARTMENT OF THE AIR FORCE - BMO	DRAWING 1
--	--------------

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## 2.0 GRAVITY DATA REDUCTION

DMAHTC/GSS obtained the basic observations for the new stations and reduced them to Simple Bouguer Anomalies (SBA) as described in Appendix A1.0. Up to three levels of terrain corrections were applied to convert the SBA to the Complete Bouguer Anomaly (CBA). First, the Defense Mapping Agency Aerospace Center (DMAAC), St. Louis, used its library of digitized terrain data and a computer program to calculate corrections out to 104 miles (167 km) from each station. When the program could not calculate the terrain effects near a station, a ring template was used to estimate the effect of terrain within approximately 3000 feet (914 m) of the station. The third level of terrain corrections was applied to those stations where 10 feet (3 m) or more of relief was observed within 130 feet (40 m). In these cases, the elevation differences were measured in the field at a distance of 130 feet (40 m) along six directions from the stations. These data were used to calculate the effect of the very near relief. The principal facts for the Sevier Desert Valley stations are listed in Appendix A 2.0.

### 3.0 GEOLOGIC SUMMARY

The Sevier Desert Valley lies within the Basin and Range physiographic province. Sevier Desert is a broad valley extending approximately 20 miles (32 km) in a north-south direction. For the purposes of this study, however, only the area north of Delta, Utah, and east of Baker Hot Springs is considered. The northern and eastern boundaries of the valley are the Simpson Mountains, Sheeprock Mountains, Gilson Mountain, and Canyon Mountains (Figure 2).

Rocks and structures have been recognized in the Sevier Desert area from six major orogenic and depositional events occurring from the late Precambrian to the Miocene and possibly the late Pleistocene (Hintze and Baer, 1979). Early Paleozoic sedimentary rocks, deposited in the Cordilleran miogeosyncline, crop out in the surrounding mountains and underlie the valley-fill deposits (Hintze and Baer, 1979). Sevier Desert lies on the southern edge of the late Paleozoic Oquirrh Basin and scattered occurrences of late Paleozoic rocks crop out in the Gilson Mountains (Stokes, 1963). The late Triassic to early Cenozoic Sevier Orogeny accounted for the majority of the folding and faulting observed in the mountains surrounding the Sevier Desert. During this orogenic event, there was general uplift accompanied by 40 to 100 miles (64 to 160 km) of eastward translation of Paleozoic strata along west dipping thrust faults. These structures were only mildly affected by the early Cenozoic Laramide Orogeny. Oligocene volcanism resulted

in thick deposits of ash flow tuffs, lava flows, stocks, and laccoliths. The present valley configuration is probably largely the result of east-west extension and associated block faulting during the late Tertiary and Quaternary periods. The probable major zones of crustal weakness below the area may be marked by the Quaternary basalt flows and cones which trend northerly into the valley from the south.

Sevier Desert is underlain by a variable thickness of Miocene to Holocene basin-fill deposits. The deeper portions of the valley are approximately 8500 feet (2591 m) deep (Hintze and Baer, 1979) with basin-fill consisting of sandstone, shale, limestone, basalt, evaporites, conglomerate, and tuff. The surficial deposits consist of lacustrine clayey sands to gravelly sands deposited in Pleistocene Lake Bonneville (Stokes, 1963) and alluvial deposits, all with varying degrees of cementation.

#### 4.0 INTERPRETATION

The basis of interpretation is the Complete Bouguer Anomaly (CBA). The CBA is defined in Appendix A1.4.

A valley filled with alluvium which has a lower density than the surrounding bedrock will create a negative anomaly. Interpretation entails the removal of regional trends leaving the gravitational reflection of the valley fill.

The gravity stations are distributed approximately on an evenly spaced grid over the portion of Sevier Desert being considered as a potential siting area for the MX missile. This area is basically restricted to public lands. Stations in surrounding areas are much more irregularly spaced.

The CBA data are reduced to a set of values at the points of a uniformly spaced geographic array, or grid. The gridding process is done using an algorithm which computes a value at each grid point using the gravity station data within a circular area around the grid point. A bell-shaped weighting function assigns greater weight to the nearer data points. The grid-point spacing is chosen to match the average data spacing. A 2-kilometer grid spacing was used for this analysis. Figure 3 shows the CBA contoured from gridded values and the gravity stations used to compute the grid values.

##### 4.1 REGIONAL-RESIDUAL SEPARATION

A fundamental step in gravity interpretation is isolation of the part of the CBA which represents the geologic feature of

interest, in this case the valley fill. The valley fill has a lower density than the bedrock and therefore creates a negative gravity anomaly. The portion of the CBA which corresponds to this alluvial material is called the "residual anomaly."

The CBA contains long-wave-length components from deep and broad geologic structures extending far beyond the valley. These long-wave-length components are called the regional gravity. Shorter wave-length components due to near-surface variations in density are called the residual (anomaly) values. Two methods were used to estimate the regional gravity:

1. Several upward continuation calculations were made to calculate the gravitational field as it would appear at higher elevations; and
2. A second order polynomial surface was calculated to fit the bedrock (Paleozoic sedimentary strata) CBA values around Sevier Desert and Dugway Valley.

The upward continuation was used because the limited number of Paleozoic outcrops in the area and the poor distribution of bedrock stations around Sevier desert do not provide a good basis for second order trend surface calculation. The regional surface used in the model calculations was a composite derived from the two methods. The regional trend was subtracted from the CBA to obtain the residual anomaly. The residual anomaly was used to calculate a simple geologic model which fits the gravity data and is consistent with geologic knowledge from other sources.

#### 4.2 DENSITY SELECTION

The construction of a geologic model from the residual anomaly requires selection of a value for the mean density contrast between basin fill and underlying rock.

Since only very general density information is available, the geologic interpretation of the gravity data can be only a coarse approximation. A one-percent change in the density used for the alluvial fill would result in a four-percent change in the calculated thickness of the fill material.

In order to estimate the density of the valley fill material, density was calculated at 13 shallow boring sites in Sevier Desert. The borings ranged in depth from 101 feet (30 m) to 181 feet (55 m). The average densities from borings ranged from 1.71 g/cm<sup>3</sup> to 2.08 g/cm<sup>3</sup>, with a grand average of 1.98 g/cm<sup>3</sup>. Because the density is expected to increase with depth (the increase in bulk density associated with increasing age and thickness of overburden is discussed by Woolard, 1962 and by Grant and West, 1965), an average fill density of 2.3 g/cm<sup>3</sup> was used.

The basement material underlying the Sevier Desert is thought to be similar to the Paleozoic carbonate rocks which are found in the surrounding mountain ranges. Published values of the densities of carbonate rocks typically range between 2.6 and 2.8 g/cm<sup>3</sup>. The Paleozoic carbonate rocks in Utah are generally reported to be relatively high in density, being on the order of 2.8 g/cm<sup>3</sup>. This value was selected to represent the density of

the basement rock. The density contrast used in the modeling process was therefore  $-0.5 \text{ g/cm}^3$ . This density contrast is further supported by density determinations from a previous gravity study near the center of Sevier Desert Valley in the area of Desert Mountain (Calkins, 1972).

#### 4.3 MODELING

Modeling was done with the aid of a computer program which calculates an iterative three-dimensional solution of gravity anomaly data (Cordell, 1970). The gravity anomaly is represented by discrete values on a two-dimensional grid. The source of the anomaly (the low-density valley fill) is represented by a set of vertical prism elements. The tops of the prisms lie in a common horizontal plane. The bottoms of the prisms collectively represent the bottom of the valley fill. Each prism has a cross-sectional area equal to one grid square and a uniform density. A grid square of 2 kilometers by 2 kilometers was selected as representative of the gravity station distribution. Computation was continued for eight iterations of mutually interactive prism adjustments. The root-mean-square of the differences between the observed CBA nodal values and the gravity values calculated from the model is less than 0.5 milligal.

The calculated thickness of the valley fill depends upon the density contrast (i.e., fill density minus rock density). Because neither density is perfectly known, nor even uniform, the

calculated thickness should be expected to contain a corresponding degree of uncertainty. The calculated thickness of fill, or interpreted depth to rock, is contoured in Drawing 2.

#### 4.4 DISCUSSION OF RESULTS

Gravity data were not obtained in the south central part of the Sevier Desert area nor was the area bounded by observations on bedrock. As a result, the interpreted model is poorly defined over much of the area.

The dominant feature of the mapped area is a broad subsurface high covering the central part of the Sevier Desert area. The alluvial thickness in this area generally is calculated to be less than 1000 feet (305 m). Fumarole Butte and Desert Mountain are included within this region. Fumarole Butte is a late Pleistocene Basaltic lava flow, and Desert Mountain contains Tertiary age granitoid igneous intrusions into Paleozoic meta-sedimentary rocks and Tertiary rhyolites. An aeromagnetic map of Utah (Zietz and others, 1976) shows relatively short wavelength, high-intensity magnetic anomalies throughout this region.

Oil-well data from the southern part of the central high (Smith and others, 1978) indicate that the top of Tertiary volcanics and sedimentary rocks is at about 2000 feet (600 m) deep, and that Paleozoic basement is greater than 8000 feet (2500 m) deep. All of these facts indicate that the central gravity high at least partly reflects the abundance of dense basalts interbedded with the basin fill. Similar aged volcanics in the adjacent

areas did not yield such high gravity values because they are silicic lavas and tuffs with densities similar to alluvial basin fill.

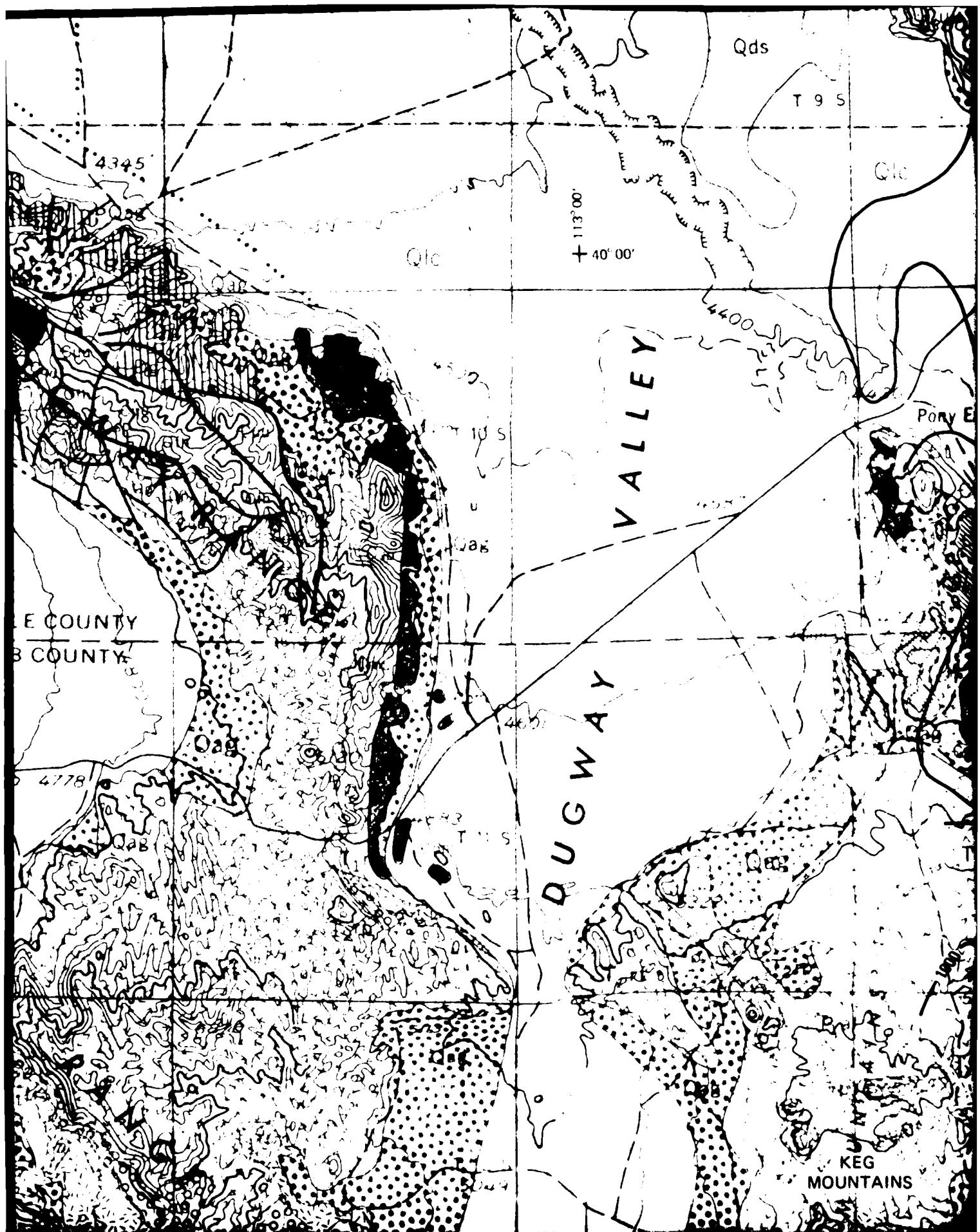
The gravity interpretation shows a narrow graben system separating the central subsurface high from the Keg Mountains to the west and northwest. This system contains two deep narrow basins. Their axes trend north-northeast, and both grabens dip to the north. The axis of the southern basin is about 3 miles (5 km) west of the northern axis. The faults bounding the southern basin are shown (Drawing 2) to extend south so that they pass along the eastern side of the Drum Mountains generally coinciding with surface faults in that area.

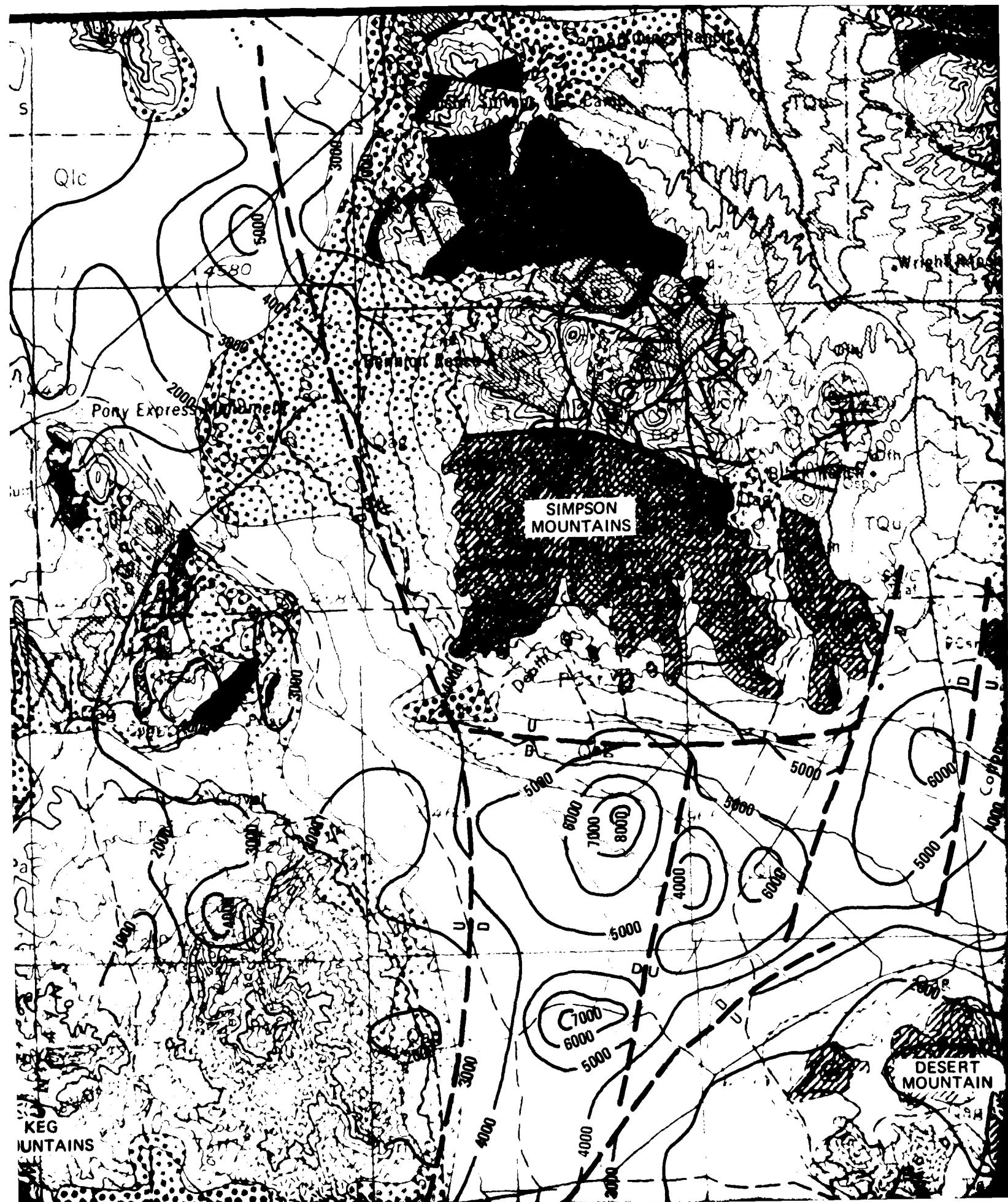
The western and northwestern margin of the central gravity high is interpreted as a long curvilinear fault system but may simply mark the edge of the subsurface basalt flows interbedded with the alluvial basin fill. However, Holocene surface ruptures in alluvium and through the surface basalts of Fumarole Butte suggest a fault system even though the gravity data do not indicate large vertical displacements in this region.

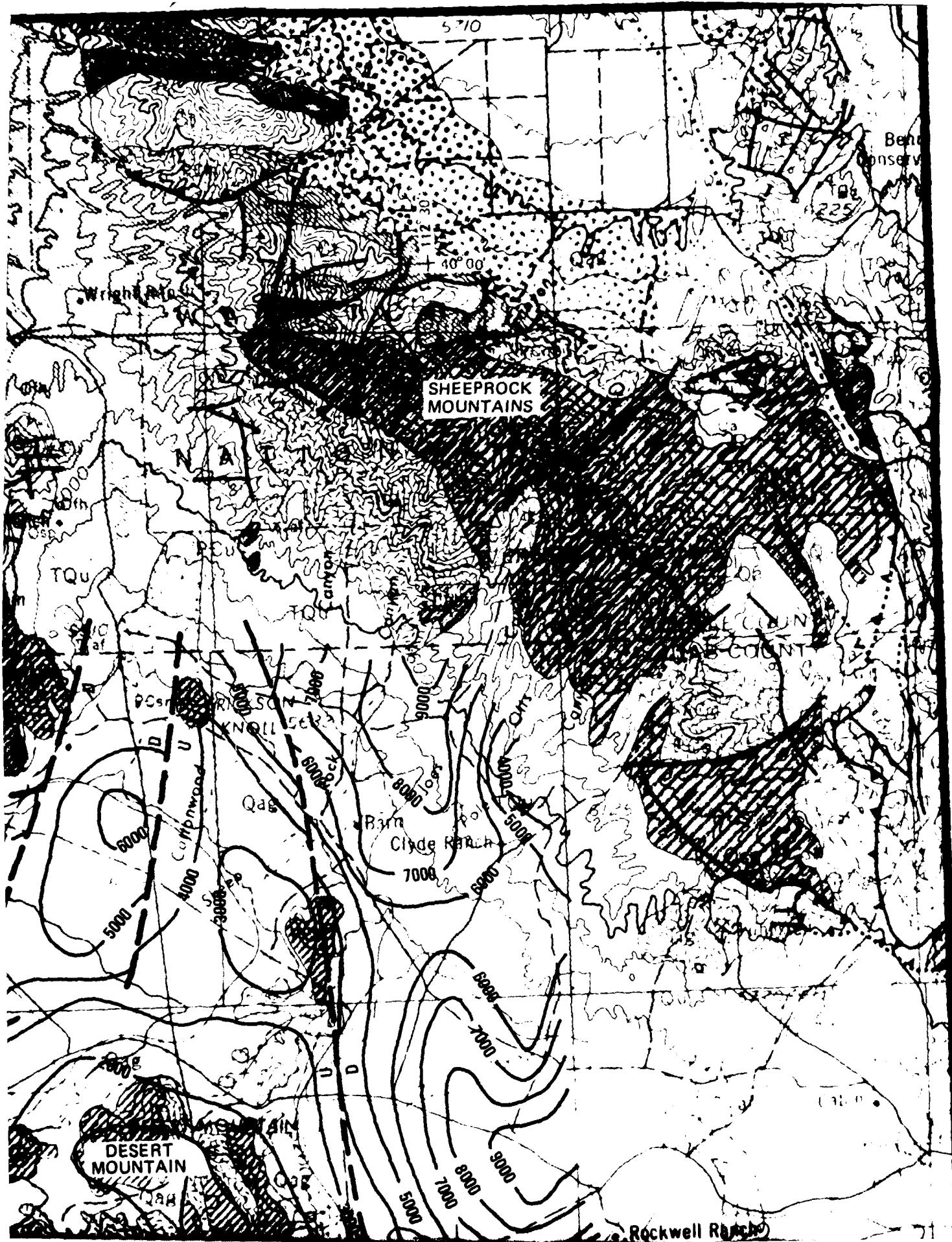
There are no gravity data covering the south-central part of the area shown in Drawing 2, but two factors indicate that the basin fill is very thick in this area. The wild cat oil well (Smith and others, 1978) in this area penetrated interbedded volcanics and alluvial deposits to its total depth of 8000 feet (2500 m) without reaching Paleozoic basement. The limited

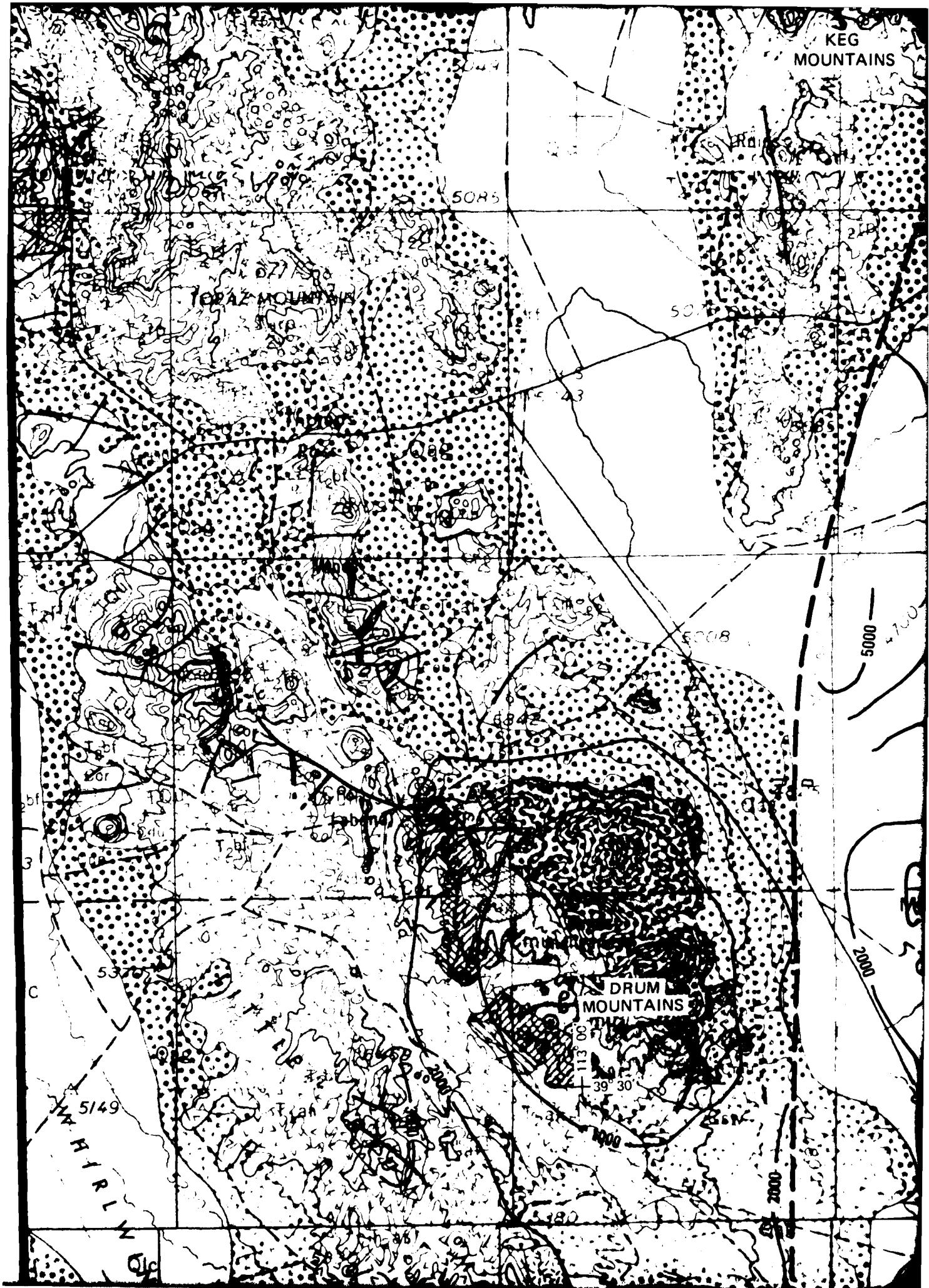
gravity data in the southeastern part of Drawing 2 suggest that the basin floor dips to the southwest.

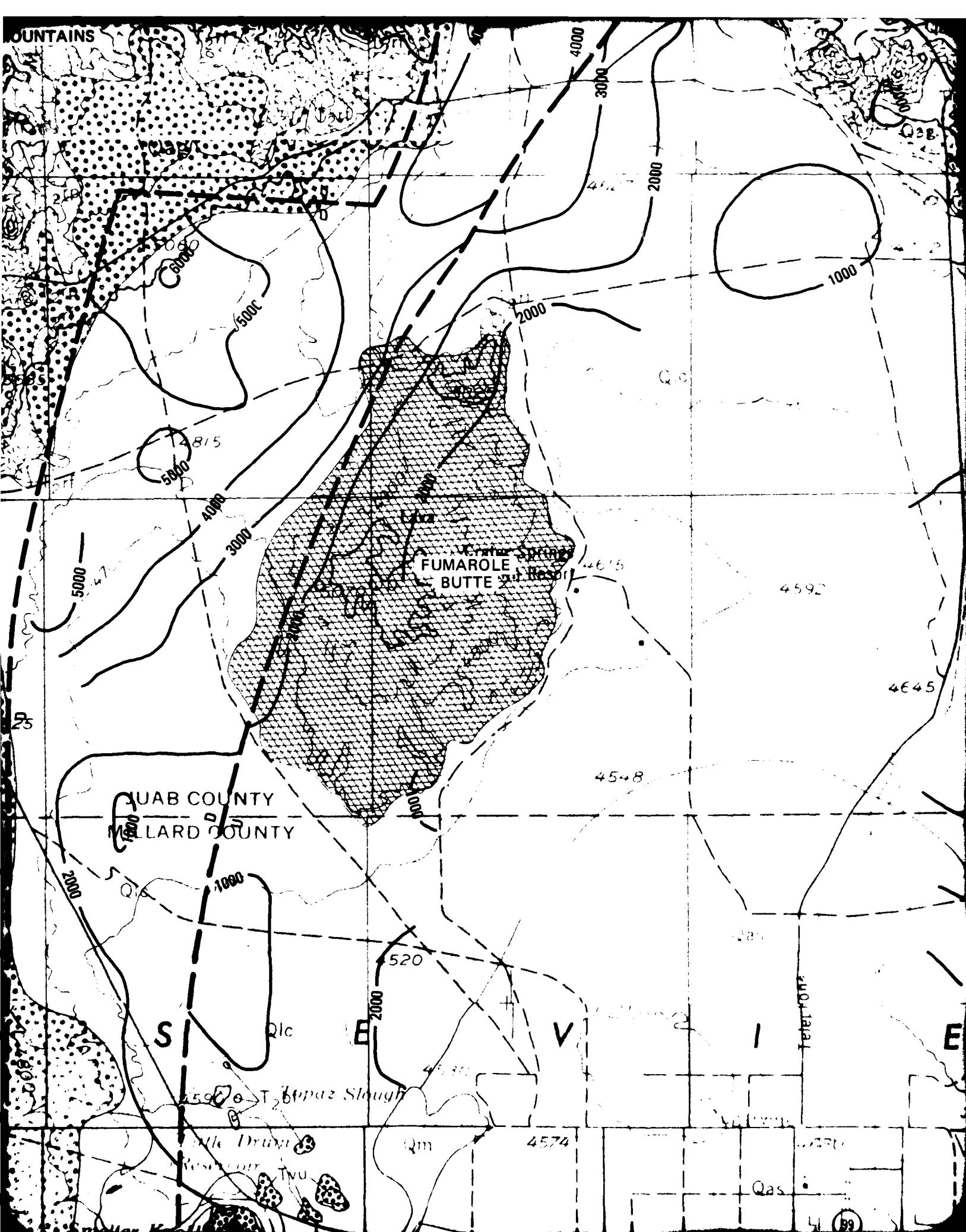
North and northeast of the central subsurface high, the interpretation shows a complex subsurface structure that includes deep basins associated with the margins of the Simpson and Sheeprock mountains.

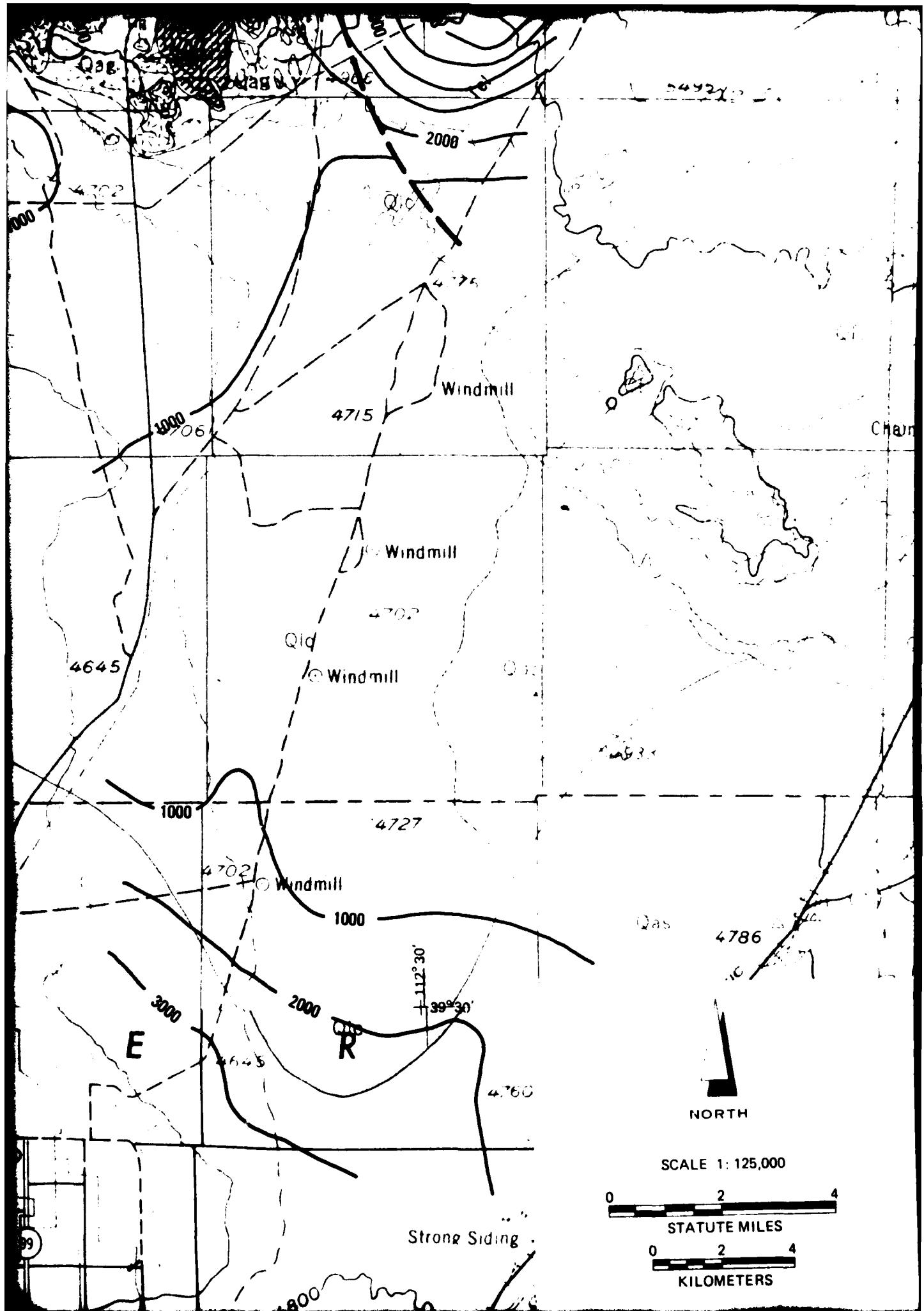


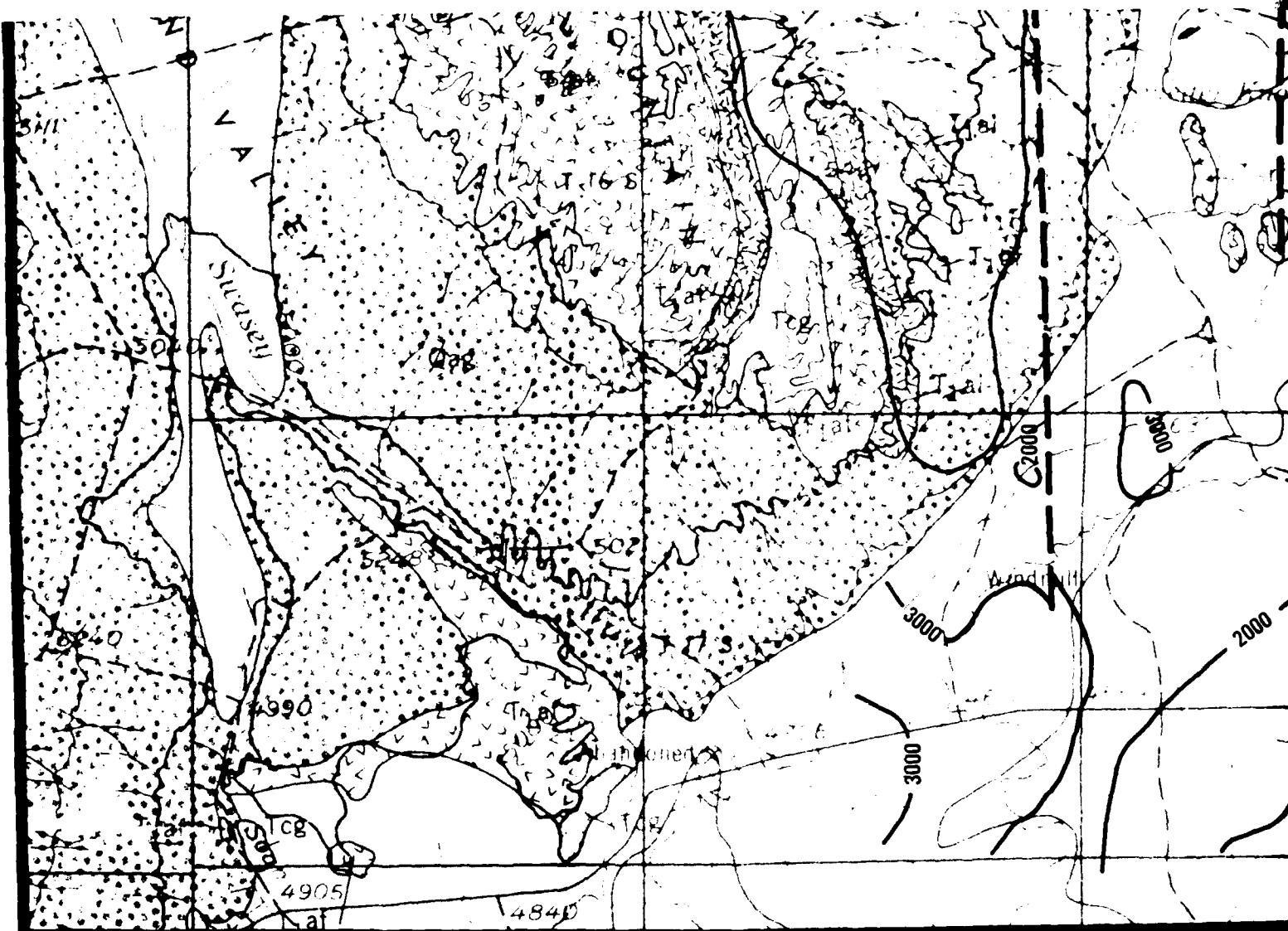




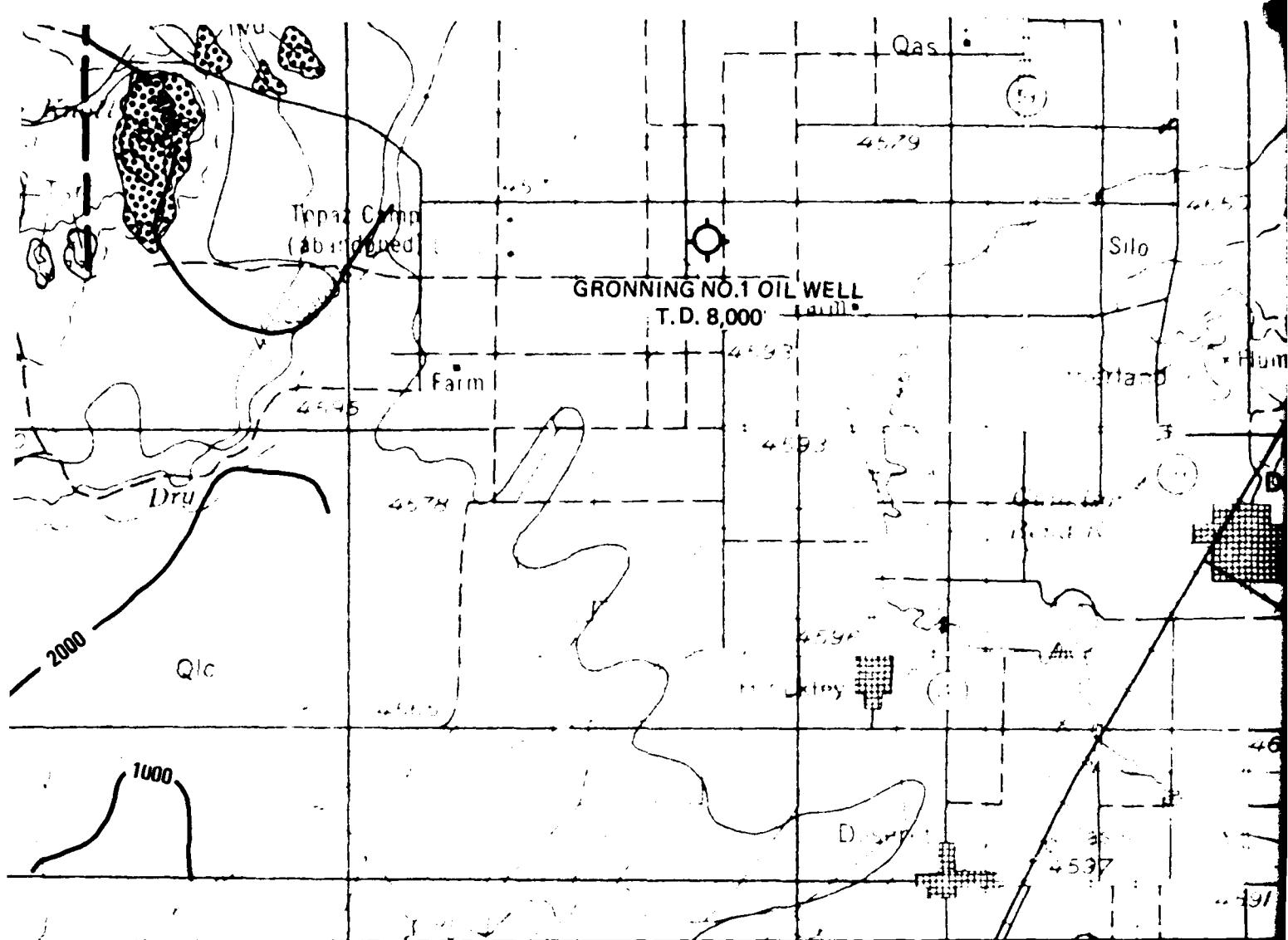


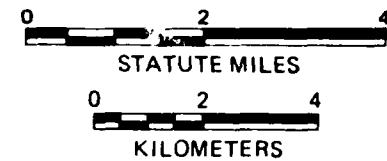
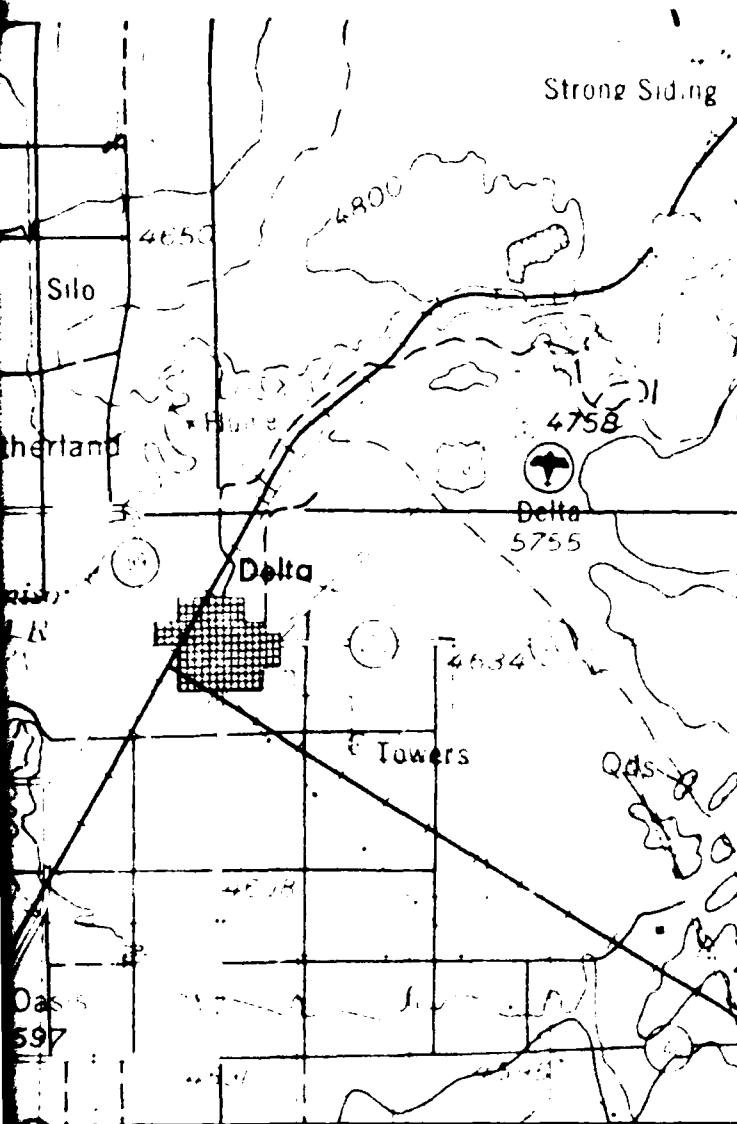






1 JAN 81





EXPLANATION

-  GRAVITY INFERRED FAULT LOCATIONS
-  FAULTS SHOWN ON GEOLOGIC BASE MAP
-  ALLUVIAL MATERIAL
-  ROCK (ALL PATTERNS)

CONTOUR INTERVAL = 1000 FT

DEPTH CALCULATIONS BASED ON  
DENSITY CONTRAST OF  $0.5 \text{ g/cm}^3$

GEOLOGIC BASE MAP: L. F. Hintze, 1963

INTERPRETED DEPTH TO BEDROCK  
SEVIER DESERT, UTAH

MX SITING INVESTIGATION  
DEPARTMENT OF THE AIR FORCE - BMO

DRAWING

2

**FUGRO NATIONAL, INC.**

### 5.0 CONCLUSIONS

The interpretation shown in Drawing 2 is consistent with information from photogeology, surface mapping, and published regional geology.

Two factors which adversely affect the results are: 1) the limited areal coverage of the gravity data; and 2) the widespread occurrence of volcanic materials in the section.

It is likely that the alluvium in the central part of the study area overlies or is interbedded with a thick sequence of dense basalts and that the basalt is absent around the edges of the Sevier Desert where the alluvium is interpreted to be several thousand feet thick. Around the edges, the alluvium may be underlain by Paleozoic sedimentary rocks.

The basalts in the central part of the area may mark the location of a fundamental crustal break through which they were extruded.

## BIBLIOGRAPHY

Anderson, L. W., and Miller, D.G., 1979, Ms., Quaternary fault map of Utah: Long Beach, California, Fugro, Inc., Consulting Engineers and Geologists, scale 1:500,000.

Calkins, W. G., 1972, Magnetic and gravity study of Desert Mountain, Juab County, Utah: Utah geological and mineralogical survey Bulletin #95.

Case, R. W., and K. Cook, A gravity survey of the Sevier Lake area, Millard County, Utah: Utah Geology, v. 6, no. 1, p. 55 to 76.

Cordell, L., 1970, Iterative solution of three-dimensional gravity anomaly data, Geological survey computer contribution No. 10: U. S. Geological Survey, Washington, D.C.

Grant, F. S., and West, G.F., 1965, Interpretation Theory in applied Geophysics: New York, McGraw Hill Book Co.

Hintze, L. F. (Compiler), 1963, Geologic map of Southwestern Utah: Brigham Young University and Utah State Land Board, scale 1:125,000.

Hintze, L. F., and Baer, J.L., 1979, Ms., Regional geological setting of the Sevier Desert: Provo, Utah, Lehi F. Hintze, consulting geologist.

Howard, E. L., 1978, Geologic map of the eastern Great Basin, Nevada and Utah, scale 1:250,000: Terra Scan Group, Ltd., Lakewood, Colorado.

Johnson, J. B., Jr., and K.L. Cooke, 1957, Regional gravity survey of parts of Tooele, Juab, and Millard counties, Utah: Geophysics, 22, 48-61, 1957.

Mabey, D. R., and H.T. Morris, 1967, Geologic interpretation of gravity and aeromagnetic maps of Tintic Valley and adjacent areas, Tooele and Juab counties, Utah: U.S. Geological Survey Professional Paper 516-D, D1-D10, 1967.

Nettleton, L. L., 1949, Geophysical prospecting for oil: New York, McGraw Hill Book Co.

Smith, T. B., Cook, K. L. and Peoples, W. J. 1978, Gravity study of the Fumarole Butte area Juab and Millard counties, Utah: Utah Geology, v. 5, no. 1, p. 37-50.

Stokes, W. L., (Compiler) 1963, Geologic Map of Northwestern Utah: Washington D.C., Williams and Heintz Map Co., scale 1:250,000.

BIBLIOGRAPHY (Cont.)

Synder, C. T., Harman, G., and Zdenek, F. F., 1964, Pleistocene lakes in the Great Basin: U.S. Geological Survey, Misc. Geological Inventory Map I-416.

Woolard, G.P., 1962, The relation of gravity anomalies to surface elevation, crustal structure and geology: Madison, Wisconsin, Univ. of Geophysical and Polar Research Center, Report 62-9.

Zietz, I., R. Shuey, and J. R. Kirby, Jr., 1976, Aeromagnetic map of Utah: U. S. Geological Survey, Map GP907.

FN-TR-33-SD

APPENDIX A1.0

GENERAL PRINCIPLES OF THE  
GRAVITY EXPLORATION METHOD

FUGRO NATIONAL, INC.

A1.0 GENERAL PRINCIPLES OF THE GRAVITY EXPLORATION METHODA1.1 GENERAL

A gravity survey involves measurement of differences in the gravitational field between various points on the earth's surface. The gravitational field values being measured are the same as those influencing all objects on the surface of the earth. They are generally associated with the force which causes a one-gm mass to be accelerated at 980 cm/sec<sup>2</sup>. This force is normally referred to as a one-g force.

Even though in many applications the gravitational field at the earth's surface is assumed to be constant, small but distinguishable differences in gravity occur from point to point. In a gravity survey, the variations are measured in terms of milligals. A milligal is equal to 0.001 cm/sec<sup>2</sup> or 0.00000102 g. The differences in gravity are caused by geometrical effects, such as differences in elevation and latitude, and by lateral variations in density within the earth. The lateral density variations are a result of changes in geologic conditions. For measurements at the surface of the earth, the largest factor influencing the pull of gravity is the density of all materials between the center of the earth and the point of measurement.

To detect changes produced by differing geological conditions, it is necessary to detect differences in the gravitational field as small as a few milligals. To recognize changes due to

geological conditions, the measurements are "corrected" to account for changes due to differences in elevation and latitude.

Given this background, the basic concept of the gravitational exploration method, the anomaly, can be introduced. If, instead of being an oblate spheroid characterized by complex density variations, the earth were made up of concentric, homogeneous shells, the gravitational field would be the same at all points on the surface of the earth. The complexities in the earth's shape and material distribution are the reason that the pull of gravity is not the same from place to place. A difference in gravity between two points which is not caused by the effects of known geometrical differences, such as in elevation, latitude, and surrounding terrain, is referred to as an "anomaly."

An anomaly reflects lateral differences in material densities. The gravitational attraction is smaller at a place underlain by relatively low density material than it is at a place underlain by a relatively high density material. The term "negative gravity anomaly" describes a situation in which the pull of gravity within a prescribed area is small compared to the area surrounding it. Low-density alluvial deposits in basins such as those in the Nevada-Utah region produce negative gravity anomalies in relation to the gravity values in the surrounding mountains which are formed by more dense rocks.

The objective of gravity exploration is to deduce the variations in geologic conditions that produce the gravity anomalies identified during a gravity survey.

### A1.2 INSTRUMENTS

The sensing element of a LaCoste and Romberg gravimeter is a mass suspended by a zero-length spring. Deflections of the mass from a null position are proportional to changes in gravitational attraction. These instruments are sealed and compensated for atmospheric pressure changes. They are maintained at a constant temperature by an internal heater element and thermostat. The absolute value of gravity is not measured directly by a gravimeter. It measures relative values of gravity between one point and the next. Gravitational differences as small as 0.01 milligal can be measured.

### A1.3 FIELD PROCEDURES

The gravimeter readings were calibrated in terms of absolute gravity by taking readings twice daily at nearby USGS gravity base stations. Gravimeter readings fluctuate because of small time-related deviations due to the effect of earth tides and instrument drift. Field readings were corrected to account for these deviations. The magnitude of the tidal correction was calculated using an equation suggested by Goguel (1954):

$$C = P + N \cos \phi (\cos \phi + \sin \phi) + S \cos \phi (\cos \phi - \sin \phi)$$

where C is the tidal correction factor, P, N, and S are time-related variables, and  $\phi$  is the latitude of the observation point. Tables giving the values of P, N, and S are published annually by the European Association of Exploration Geophysicists.

The meter drift correction was based on readings taken at a designated base station at the start and end of each day. Any difference between these two readings after they were corrected for tidal effects was considered to have been the result of instrumental drift. It was assumed that this drift occurred at a uniform rate between the two readings. Corrections for drift were typically only a few hundredths of a milligal. Readings corrected for tidal effects and instrumental drift represented the observed gravity at each station. The observed gravity values represent the total gravitational pull of the entire earth at the measurement stations.

#### A1.4 DATA REDUCTION

Several corrections or reductions are made to the observed gravity to isolate the portion of the gravitational pull which is due to the crustal and near-surface materials. The gravity remaining after these reductions is called the "Bouguer Anomaly." Bouguer Anomaly values are the basis for geologic interpretation. To obtain the Bouguer Anomaly, the observed gravity is adjusted to the value it would have had if it had been measured at the geoid, a theoretically defined surface which approximates the surface of mean sea level. The difference between the "adjusted" observed gravity and the gravity at the geoid calculated for a theoretically homogeneous earth is the Bouguer Anomaly.

Four separate reductions, to account for four geometrical effects, are made to the observed gravity at each station to arrive at its Bouguer Anomaly value.

a. Free-Air Effect: Gravitational attraction varies inversely as the square of the distance from the center of the earth. Thus corrections must be applied for elevation. Observed gravity levels are corrected for elevation using the normal vertical gradient of:

$$FA = -0.09406 \text{ mg/ft} \text{ (-0.3086 milligals/meter)}$$

where FA is the free-air effect (the rate of change of gravity with distance from the center of the earth). The free-air correction is positive in sign since the correction is opposite the effect.

b. Bouguer Effect: Like the free-air effect, the Bouguer effect is a function of the elevation of the station, but it considers the influence of a slab of earth materials between the observation point on the surface of the earth and the corresponding point on the geoid (sea level). Normal practice, which is to assume that the density of the slab is 2.67 grams per cubic centimeter was followed in these studies. The Bouguer correction ( $B_C$ ), which is opposite in sign to the free-air correction, was defined according to the following formula.

$$B_C = 0.01276 (2.67) h_f \text{ (milligals per foot)}$$

$$B_C = 0.04185 (2.67) h_m \text{ (milligals per meter)}$$

where  $h_f$  is the height above sea level in feet and  $h_m$  is the height in meters.

c. Latitude Effect: Points at different latitudes will have different "gravities" for two reasons. The earth (and the geoid) is spheroidal, or flattened at the poles. Since points at higher latitudes are closer to the center of the earth than points near the equator, the gravity at the higher latitudes is larger. As the earth spins, the centrifugal acceleration causes a slight decrease in gravity. At the higher latitudes where the earth's radii are smaller, the centrifugal acceleration diminishes. The gravity formula for the Geodetic Reference System, 1967, gives the theoretical value of gravity at the geoid as a function of latitude. It is:

$$g = 978.0381 (1 + 0.0053204 \sin^2 \phi - 0.0000058 \sin^2 2\phi)$$
 gals  
where  $g$  is the theoretical acceleration of gravity and  $\phi$  is the latitude in degrees. The positive term accounts for the spheroidal shape of the earth. The negative term adjusts for the centrifugal acceleration.

The previous two corrections (free air and Bouguer) have adjusted the observed gravity to the value it would have had at the geoid (sea level). The theoretical value at the geoid for the latitude of the station is then subtracted from the adjusted observed gravity. The remainder is called the Simple Bouguer Anomaly (SBA). Most of this gravity represents the effect of material beneath the station, but part of it may be due to irregularities in terrain (upper part of the Bouguer slab) away from the station.

d. Terrain Effect: Topographic relief around the station has a negative effect on the gravitational force at the station. A nearby hill has upward gravitational pull and a nearby valley contributes less downward attraction than a nearby material would have. Therefore, the corrections are always positive. Corrections are made to the SBA when the terrain effects were 0.1 milligal or larger. Terrain corrected Bouguer values are called the Complete Bouguer Anomaly (CBA). When the CBA is obtained, the reduction of gravity at individual measurement points (stations) is complete.

#### A1.5 INTERPRETATION

The first step in interpretation is to separate the portion of the CBA that might be caused by the light-weight, basin-fill material overlying the heavier bedrock material which forms the surrounding mountains and presumably the basin floor. Since the valley-fill sediments are absent at the stations read in the mountains, the CBA values at bedrock stations are used as the basis for constructing a second order polynomial surface to represent a regional field over the valley. A regional field is an estimation of the values the CBA would have had if the light-weight sediments (the anomaly) had not been there.

Where there are insufficient bedrock stations to define a satisfactory regional trend, a regional may be estimated by the process of upward continuation of the CBA field.

In Potential Theory, a field normal to a surface, regardless of its actual source, may be considered as originating in an areal

distribution of mass on that surface, and if the field strength is known the surface density of mass (grams per square centimeter) can be calculated. The observed gravity field at the surface of the earth approximately fulfills the requirements of this theory: thus the observed (Bouguer anomaly) field can be used to compute a surficial distribution of mass which would reproduce the field, and most importantly, account for the gravity field anywhere above the surface of observation. On this basis, the Bouguer anomaly field is readily "continued" to level surfaces above the ground.

An important property of such "upward continuation" is that the resultant field (which can be represented by a contour map), with increasing altitudes of continuation, changes more with respect to shallow sources than it does with respect to deeper sources. The anomalous parts of the field ascribed to shallow density distributions tend to vanish as the continuation is carried upward whereas the field produced by deeper sources changes only slightly, so that upward continuations produce "regional"-type fields. Residual separations then can be made for the purpose of "pin-pointing" shallow sources such as the alluvial fill.

The difference between the CBA and the regional field is called the "residual" field or residual anomaly. The residual field is the interpreter's estimation of the gravitational effect of the geologic anomaly. The zero value of the residual anomaly is not exactly at the rock outcrop line but at some distance on the "rock" side of the contact. The reason for this is found in the

explanation of the terrain effect. There is a component of gravitational attraction from material which is not directly beneath a point.

If the "regional" is well chosen, the magnitude of the residual anomaly is a function of the thickness of the anomalous (fill) material and the density contrast. The density contrast is the difference in density between the alluvial and bedrock material. If this contrast were known, an accurate calculation of the thickness could be made. In most cases, the densities are not well known and they also vary within the study area. In these cases, it is necessary to use typical densities for materials similar to those in the study area.

If the selected average density contrast is smaller than the actual density contrast, the computed depth to bedrock will be greater than the actual depth and vice-versa. The computed depth is inversely proportional to the density contrast. A ten percent error in density contrast produces a ten percent error in computed depth. An iterative computer program is used to calculate a subsurface model which will yield a gravitational field to match (approximately) the residual gravity anomaly.

## SEVIER DESERT, UTAH GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	ELFV. +CODE	TER-DIR. TN/UTM	NORTH UTM	EAST UTM	DBSV	THEC	FAA	CHA
										+1000
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SD0205	394187	1123385	4732U	0	62439518	36589168862214207	-816	H3107		
SD0206	394099	1123385	4703U	0	55439355	36586168678214077	-1141	H2873		
SD0207	394267	1123324	4803Y	0	67439665	36079168589214326	-538	H3148		
SD0208	394372	1123314	4898Y	0	88430859	36696168156214481	-232	H3150		
SD0210	394443	1122860	5001U	0	73439979	37347165782214587	-1742	H1274		
SD0211	394374	1122759	4995S	0	75439849	37489166775214484	-703	H2335		
SD0212	394374	1122987	4928S	0	67439854	37164166800214484	-1309	H1950		
SD0213	394274	1122877	4900S	0	66439667	37318167720214336	-505	H2849		
SD0214	394185	1122989	4834S	0	60439505	37155168822214205	108	H3681		
SD0215	394187	1122761	4904S	0	74439503	37481168445214207	387	H3735		
SD0217	393701	1124973	4957U	0	66438662	3430116626121348H	-578	H2581		
SD0220	393449	1124920	4886U	0	54438379	343711566688213263	-594	H2795		
SD0222	393449	1124808	4858U	0	40438191	34528166758213114	-640	H2840		
SD0224	393316	1124849	4738V	0	44437946	3446416742921291H	-900	H2984		
SD0225	394464	1123262	5154Y	0	96440027	36774166541214618	426	H2944		
SD0226	394372	1123217	4905Y	0	75439856	36835168116214481	-206	H3139		
SD0227	394086	1123103	4750U	0	56439324	36989169114214058	-244	H3611		
SD0228	394274	1123102	4856V	0	63439672	36996168476214336	-163	H3338		
SD0229	394467	1123065	4966Y	0	73440028	37055166506214622	-1383	H1752		
SD0230	394177	1123229	4760Y	0	59439496	36812168800214192	-599	H3225		
SD0233	393988	1123148	4719Y	0	51439144	36921169475213913	-30	H3926		
SD0234	393899	112307747211T		0	50438978	37020169586213780	232	H4180		
SD0235	393819	1123037	4745Y	0	49438829	37075168864213663	-145	H3720		
SD0236	393795	1123209	4726S	0	46438789	36828168857213627	-296	H3631		
SD0237	393889	1123216	4686S	0	48438963	36821169646213766	-22	H4043		
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SD0252	393396	1123515	4635U	0	42438058	36377168825213030	-593	H3641		
SD0253	393576	1123554	4637U	0	43438392	36327169003213302	-663	H3564		
SD0254	393683	1123497	4692U	0	43438584	36413168839213461	-468	H3572		
SD0255	393489	1123441	4723U	0	42438228	36486168110213173	-617	H3316		
SD0256	393315	1123442	4663V	0	41437906	36474168239212410	-796	H3341		
SD0257	393175	1123424	4692U	0	40437647	36501167356212709	-1199	H2838		
SD0258	393068	112338447001T		0	41437448	36554166884212551	-1437	H2574		

## SEVTER DESERT, UTAH GRAVITY DATA

STATION IDENT.	LAT. DEG MIN +0000	LONG. DEG MIN +0000	ELFV. FT/HR-CMHR.	NORTH TN/UT	EAST UTM	GRAV	TMFC	FAA	CHA
SD0259	393185	1123336	4739U	0	44437063	36627167277212723	-849	83031	
SD0260	393270	11233194	7392T	0	43437820	36654167508212649	-745	83134	
SD0261	393426	1123390	4732U	0	43438110	3655716784321308J	-706	83197	
SD0262	393613	1123360	4689H	0	43438456	36606168784213357	-448	83602	
SD0263	393703	1123357	4697H	0	44438022	36613168980213491	-310	83714	
SD0264	393664	1123214	4723U	0	45438546	36817168670213433	-317	83620	
SD0265	393577	1123215	4721U	0	44438385	36813168383213304	-494	83448	
SD0266	393476	1123241	4723U	0	43438199	36772168131213155	-578	83356	
SD0267	393365	1123275	4730U	0	42437995	36720167816212990	-663	83247	
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SD0269	393140	1123217	4746U	0	43437577	36796167302212657	-693	83162	
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SD0271	393142	1123102	4750U	0	43437578	36961167390212660	-570	83272	
SD0272	393307	1123132	4736U	0	43437884	36923167958212904	-378	83511	
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SD0274	393489	1123105	4708H	0	43438220	36967168228213173	-643	83343	
SD0275	393598	1123103	4717H	0	45438422	36974168591213335	-355	83602	
SD0276	393689	1123106	4710H	0	46438590	36972168915213470	-231	83750	
SD0277	394012	1122987	4747H	0	55439185	37152169242213948	-34	83820	
SD0278	393923	11229384	7500T	0	53439019	37220169077213810	-41	83811	
SD0280	393577	1122991	4741S	0	46438380	37133168389213304	-300	83576	
SD0281	393403	1122990	4742S	0	44438058	37124168107213046	-315	83555	
SD0282	393227	1122991	4758S	0	44437733	37122167825212780	-186	83630	
SD0283	393052	1122992	4746S	0	44437409	37116166901212527	-963	82893	
SD0284	393139	1122879	4750S	0	46437567	37280167334212655	-622	83224	
SD0285	393315	1122878	4758S	0	45437893	37287168105212910	-36	83781	
SD0286	393491	1122882	4750S	0	46438218	37287168244213177	-233	83612	
SD0287	393663	1122883	4760S	0	48438537	37290168777213431	140	83053	
SD0288	393837	1122878	4753S	0	53438658	37303169018213684	57	83699	
SD0289	394012	1122763	4850S	0	60439179	37473168763213048	456	83974	
SD0290	393926	1122764	4802S	0	61439020	374691689987213821	356	84039	
SD0291	393754	1122770	4771H	0	52438702	37455168807213560	139	83918	
SD0292	393584	1122770	4761S	0	49438388	37450168578213314	3	83808	
SD0293	393410	1122769	4770S	0	48438066	37466168499213057	331	84106	
SD0294	393234	1122768	4778S	0	46437740	37442167991212790	161	83911	
SD0295	393057	1122768	4766S	0	47437413	37437166873212534	-808	82983	
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SD0297	393322	1122631	4786S	0	48437900	37641168544212927	697	84421	
SD0298	393497	1122632	4771S	0	49438224	37645168349213185	61	83938	
SD0299	393654	1122662	47631	0	53439515	37606168579213418	-16	83791	
SD0300	393844	1122641	4876S	0	59438866	37642168286213699	473	83901	
SD0301	393584	1122521	4787S	0	54438382	37806168316213314	56	83777	
SD0303	393410	1122519	4782S	0	50438060	37804168434213057	370	84116	
SD0304	393231	1122541	4769H	0	50437730	37767167836212791	-77	83707	
SD0305	393056	1122541	4774S	0	52437400	37752167107212533	-500	83249	
SD0306	393144	1122427	4780S	0	53437566	37926167122212663	-554	83191	
SD0307	393323	112240H	4777S	0	52437897	3796016777212926	-197	83562	

## SEVIER DESERT, UTAH GRAVITY DATA

STATION	LAT.	LONG.	LEV.	TER-CUR.	NORTH	EAST	OBSV	THEO	FAA	CHA
IDFNT.	CFG	MTN	DFG	MIN	CODE	IN/OUT	UTM	UTM	GRAV	GRAV
S00308	393502	112239347831T	0	55438228	37987168200213193	18	83759			
S00310	393401	112229647812T	0	56438039	381231679712131044	-81	83669			
S00311	393230	1122315	4786S	0	55437723	38091167016212791	-736	82996		
S00312	393410	112207248169T	0	67438050	38444167660213057	-66	83472			
S00313	393278	112215447851T	0	61437808	38323167131212862	-701	83040			
S00314	392968	1122654	4779H	0	49437246	37597166712212402	-717	83072		
S00315	392883	1122542	4782D	0	57437086	37755166828212277	-448	83299		
S00316	392739	1122630	4779D	0	58436822	37625166601212064	-490	83268		
S00317	392631	112278947664T	0	51436025	37394166215211904	-834	82960			
S00318	392794	1122770	4778D	0	49436926	37426166265212145	-916	82836		
S00319	392881	1122769	4778D	0	48437087	37430166352212274	-959	82793		
S00320	392966	1122881	4765D	0	45437247	37272166400212400	-1159	82634		
S00321	392792	1122882	4764D	0	46436925	37265166113212142	-1197	82600		
S00322	392687	1122996	4756H	0	46436734	37099165812211987	-1419	82406		
S00323	392879	1122993	4750S	0	44437089	37109166250212271	-1371	82522		
S00324	392966	1123105	4736U	0	43437253	36951166573212400	-1257	82633		
S00325	392792	1123106	4733U	0	44436931	36944165986212142	-1016	82285		
S00326	392592	1123053	4759U	0	47436560	37014165619211846	-1442	82373		
S00327	392682	1123173	4750S	0	44436729	36845165570211980	-1710	82133		
S00328	392879	1123217	4737U	0	42437094	36788166087212271	-1607	82279		
S00329	392966	1123330	4726U	0	42437258	36629166248212400	-1678	82245		
S00330	392792	1123330	4657U	0	42436936	36625166179212142	-2139	82019		
S00331	392879	1123462	4639U	0	39437100	36437166271212271	-2345	81872		
S00332	392966	1123554	4645U	0	39437264	36307166327212400	-2362	81835		
S00333	395320	1124117	5623S	0	298441033	35582163738215887	770	81889		
S00011	395949	1124901	4778S	0	185442818	3448917031216820	-1547	82342		
S00015	395838	1124979	4752S	0	141442615	34374170802216655	-1130	82798		
S00016	395855	1124862	4960S	0	178442643	3454116912721680	-878	82383		
S00017	395895	1124749	5227S	0	255442714	34703167440216740	-109	82318		
S00018	395831	1124542	6097S	0	434442590	34995162168216645	2408	82545		
S00019	395773	1124775	5202S	0	214442489	34662167433216559	-172	82299		
S00020	395768	1124894	4920S	0	166442483	34492169595216552	-657	82728		
S00023	395684	1124791	5161S	0	194442325	34635167503216427	-354	82237		
S00024	395614	1124921	4808S	0	156442199	34448169699216323	-1378	82379		
S00027	395533	1124839	4860S	0	169442047	34561169061216203	-1321	82241		
S00028	395566	1124725	5225C	0	219442104	34725166481216252	-199	82199		
S00030	395473	1124671	5219C	0	231441931	34799166695216114	-302	82127		
S00031	395424	1124792	4715C	0	197441844	34624169786216041	-1686	82230		
S00032	395447	1124904	4533C	0	174441890	34460171139216070	-2279	82434		
S00033	395404	1124602	5219C	0	268441804	34894166651216013	-246	82221		
S00034	395306	1124653	4776C	0	230441622	348181649158215866	-1765	82175		
S00035	395321	1124784	45H1C	0	175441653	34632170502215886	-2278	82273		
S00036	395314	1124897	4549S	0	148441644	34471171174215878	-1696	82736		
S00038	395296	1124487	5209S	0	210441599	35054166190215852	-641	81803		
S00039	395321	1124344	5440S	0	257441641	35259164707215888	14	81717		
S00042	395333	1123892	5510S	0	236441651	35904164671215906	619	82042		
S00043	395354	1123681	5399S	0	166441684	36205165163215930	35	81781		

## SEVIER DESERT, UTAH GRAVITY DATA

STATION IDENT.	LAT. DEG	LONG. MIN	ELFV. +CODE	TER-COR. TM/UTM	NORTH UTM	EAST UTM	OBSV GRAV	THEL GRAV	FAA GRAV	CRA +1000
SD0044	395422	1123554	5460S	0	162441807	36388164498216038	-159	81381		
SD0045	395423	1123361	5652S	0	187441804	36663163244216040	396	81305		
SD0046	395457	1123176	5980S	0	248441862	36928160943216091	1133	80984		
SD0048	395331	1123193	5632S	0	191441630	36900162513215903	-387	80595		
SD0049	395262	1123359	5377S	0	140441506	36661165078215401	-121	81680		
SD0050	395323	1123535	5342S	0	142441623	36412165287215691	-332	81500		
SD0053	395073	1122757	5837Y	0	201441142	37513161909215520	1322	81615		
SD0054	395035	1122923	5563Y	0	147441075	37275163039215464	-77	81096		
SD0056	394830	1122909	5312Y	0	108440696	37289163845215160	-1325	80665		
SD0057	394806	1122811	5355Y	0	115440649	37428153700215125	-1029	80621		
SD0058	394698	1122952	5154Y	0	90440453	37224164479214965	-1983	80529		
SD0059	394723	1122758	5318Y	0	101440494	37501163597215002	-1357	80605		
SD0061	394636	1122872	5145Y	0	87440330	37330164334214873	-2120	80419		
SD0062	394550	1122759	5119Y	0	85440174	3749516462214745	-2110	80510		
SD0063	394511	1122952	5014Y	0	76440107	37218165543214688	-1957	81016		
SD0064	395210	1123033	5750Y	0	169441402	37124161569215724	-41	80517		
SD0065	395169	1123240	5385Y	0	135441331	36827164748215663	-237	81531		
SD0066	395147	1123462	5201S	0	115441296	36510166186215630	-498	81677		
SD0067	395222	1123589	5206Y	0	124441438	36332165637215741	-1112	81256		
SD0068	395131	1123711	5078Y	0	113441273	36155166574215607	-1245	81548		
SD0069	395085	1123572	5093Y	0	108441184	36351166303215538	-1307	81431		
SD0070	395079	1123321	5282S	0	119441167	36709165947215530	127	82230		
SD0071	395117	1123045	5582Y	0	151441230	37104162673215586	-380	80732		
SD0072	395056	1123148	5406Y	0	125441120	36955163717215495	-903	80784		
SD0074	395027	1123475	5102Y	0	103441074	36488166610215452	-829	81873		
SD0075	395003	1123651	5006Y	0	97441034	36230166797215417	-1511	81512		
SD0076	394920	1123673	4961S	0	91440881	36202167479215294	-1129	82041		
SD0077	394920	1123550	5002Y	0	96440878	36377167279215294	-943	82093		
SD0078	394955	1123329	5142Y	0	122440937	36694166540215345	-416	82168		
SD0079	394975	1123088	5376Y	0	112440968	37038164245215375	-537	81279		
SD0080	394854	1123068	5267Y	0	100440744	37063164543215196	-1086	81049		
SD0081	394877	1123191	5232Y	0	103440790	36888165500215230	-493	81765		
SD0082	394862	1123402	5084Y	0	102440767	36587166838215208	-526	82230		
SD0083	394812	1123531	5057Y	0	112440678	36401167042215134	-501	82363		
SD0084	394840	1123666	4932Y	0	104440673	36209168040215175	-713	82669		
SD0086	394739	1123397	5223Y	0	101440539	36590166173215026	506	82493		
SD0087	394748	1123270	5170U	0	91440553	36763166182215039	-203	82254		
SD0088	394746	1123113	5177U	0	89440545	36995165106215036	-1210	81222		
SD0089	394624	1123059	5075Y	0	83440318	37068165439214855	-1057	81117		
SD0090	394636	1123161	5086Y	0	84440343	36923166023214873	-987	81750		
SD0091	394632	1123282	5175Y	0	99440339	36750166258214867	92	82541		
SD0094	394513	1123129	4986Y	0	79440115	36965166719214691	-1050	82023		
SD0095	395236	1123805	5198Y	0	182441469	36024166361215763	-485	81968		
SD0096	395201	1123964	5179Y	0	156441409	35796166252215710	-721	81771		
SD0097	395238	1124178	5219Y	0	209441483	35493165801215766	-850	81559		
SD0098	395179	1124308	4986Y	0	161441377	35305167103215670	-1654	81501		
SD0099	395215	1124434	5027H	0	164441447	35127167100215731	-1325	81694		

## SEVTER DESERT, UTAH GRAVITY DATA

STATION	LAT.	LONG.	ELEV.	TER-COR.	NORTH	EAST	DESV	THEO	FAA	CRA
IDENT.	DEG	MIN	DEG	MTR	CODE	IN/OUT	HTM	HTM	GRAV	GRAV
SD0142	394802	1124680	4896Y	0	149440690	34761167955215114	-1090	82360		
SD0144	394691	1124726	5165S	0	178440494	34690166430214960	76	82036		
SD0146	394623	1124568	4681S	0	114440356	34914168679214853	-2124	82024		
SD0147	394520	1124666	4876S	0	118440168	34771167439214701	-1375	82112		
SD0148	394478	1124570	4712Y	0	82440088	34906168027214638	-2270	81741		
SD0149	394466	1124777	5046Y	0	128440071	34610160347214621	-787	82130		
SD0154	394388	1124917	5126Y	0	115430931	34407165362214505	-904	81728		
SD0155	394360	1124789	4912V	0	89430876	34589166991214464	-1248	82088		
SD0156	394424	1124668	4816H	0	85430991	34764167479214559	-1758	81901		
SD0157	394334	1124614	4683Y	0	67430823	34838168055214425	-2300	81794		
SD0158	394277	1124509	45981T	0	69430714	34986168720214341	-2348	82038		
SD0160	394247	1124694	4917Y	0	76430670	34435166398214296	-1627	81679		
SD0164	394130	1124864	4771H	0	57430452	34473167159214123	-2066	81718		
SD0185	394131	1124708	4686H	0	58430450	34696168146214124	-1874	82201		
SD0166	394186	1124566	4623Y	0	66430547	34901168846214206	-1856	82442		
SD0167	394055	1124789	4765Y	0	55430311	34570167412214012	-1758	82045		
SD0168	394007	1124970	4794U	0	53430228	34317166722213941	-2105	81597		
SD0171	393922	112441	4782U	0	50430070	34355166895213815	-1919	81821		
SD0172	393940	1124671	4998U	0	51430090	34696167305213841	-444	82902		
SD0174	393801	1124671	4924Y	0	52430838	34737167255213636	6	83246		
SD0175	393838	1124906	4836V	0	484308913	34402166994213691	-1187	82366		
SD0177	394496	1124404	4600U	0	81440116	35104168716214665	-2661	81730		
SD0178	394481	1124159	4680U	0	63440082	35495169254214643	-1348	82753		
SD0179	394461	1124002	4724U	0	67440001	35717160211214613	-947	83006		
SD0180	394466	1123837	4790U	0	99440046	35953168944214621	-600	83161		
SD0181	394338	1123816	4714U	0	654300808	35978169524214431	-547	83440		
SD0182	394338	1123963	4673U	0	58430812	35768169677214431	-762	83352		
SD0183	394362	1124117	4650U	0	59430861	35549169519214466	-1189	83010		
SD0184	394415	1124283	4633U	0	61430963	35314168985214545	-1963	82297		
SD0185	394387	1124445	4599U	0	74430917	35024168634214504	-2591	81707		
SD0186	394317	1124381	4601U	0	60430785	35170168924214400	-2178	82149		
SD0187	394273	1124230	4614U	0	55430699	35384169188214335	-1726	82592		
SD0188	394243	1124067	4619U	0	56430639	35016169750214291	-1073	83229		
SD0189	394211	1123914	4629U	0	54430576	35834170100214243	-583	83683		
SD0190	394180	1123761	4647U	0	56430515	36051169654214197	-814	83393		
SD0191	394092	1123872	4612U	0	56430359	35890169443214066	-1224	83096		
SD0192	394126	1124025	4600U	0	51430422	35072169737214117	-1002	83270		
SD0193	394156	1124177	4599U	0	52430481	35456169399214162	-1483	82883		
SD0194	394218	1124368	4592U	0	58430601	35185169230214253	-1813	82584		
SD0195	394143	1124483	4608Y	0	63430466	35016169473214142	-1306	83046		
SD0196	394100	1124328	4695U	0	53430382	35238169459214078	-438	83602		
SD0197	394462	1123712	4947Y	0	105440035	36131167639214615	-423	82809		
SD0198	394270	1123687	4724U	0	63430679	36160169330214330	-545	83406		
SD0199	394082	1123718	4626U	0	51430332	36110169344214052	-1176	83098		
SD0201	394214	1123572	4704U	0	62430573	36323169024214248	-960	83058		
SD0202	394369	1123589	4839Y	0	11430866	36303168462214477	-477	83124		
DW0032	395314	1125431	5298S	46	239401659	33709166598215878	560	82782		

## SEVIER DESERT, UTAH GRAVITY DATA

STATION	LAT.	LONG.	ELEV.	TER-COR.	NORTH	EAST	UTM	UTM	UTM	GRAV	GRAV	GRAV	GRAV
SD0100	395134	1124410	4849C	0	133441297	35158167952215611	-2027	81568					
SD0101	395112	1124225	4867Y	0	134441251	35421167384215578	-2393	81141					
SD0102	395124	1124092	4954Y	0	139441270	35611167134215596	-1842	81400					
SD0103	395108	1123896	5060Y	0	114441235	35890166746215573	-1209	81647					
SD0104	395010	1123822	4939Y	0	100441052	35992167257215427	-1692	81563					
SD0105	395024	1123961	4922Y	0	100441081	35795167083215448	-2047	81266					
SD0106	395011	1124092	4954Y	0	101441061	35607167383215429	-1426	81778					
SD0107	395021	1124225	4784Y	0	105441083	35418167595215444	-2829	80960					
SD0108	395026	1124376	4690S	0	115441096	35203168458215451	-2658	81261					
SD0109	394907	1124370	4644Y	0	93440876	35207168479215274	-2693	81560					
SD0110	394928	1124244	4723Y	0	88440911	35388168479215305	-2381	81598					
SD0111	394909	1124103	4769Y	0	85440872	35588167995215277	-2404	81416					
SD0112	394902	1123954	4838S	0	84440855	35800167737215267	-2002	81581					
SD0113	394899	1123802	4891Y	0	87440846	36017167794215263	-1442	81963					
SD0114	394795	1123807	4888Y	0	87440654	36006168221215109	-689	82527					
SD0115	394801	1123956	4810R	0	77440669	35794168397215117	-1455	82216					
SD0116	394798	1124116	4806V	0	71440667	35566168069215113	-1820	81859					
SD0117	394797	1124229	4768V	0	71440668	35404167968215112	-2274	81535					
SD0118	394797	1124342	4679Y	0	77440672	35243168384215112	-2696	81423					
SD0119	394739	1124487	4585I	0	108440568	35034169360215026	-2519	81951					
SD0120	394684	1124324	4762U	0	67440462	35265167951214944	-2180	81645					
SD0121	394695	1124191	4775H	0	66440479	35455168229214960	-1797	81983					
SD0122	394709	1124002	4803Y	0	73440500	35725168811214981	-971	82720					
SD0124	394593	1123820	4992Y	0	103440280	35981167803214809	-29	83048					
SD0125	394583	1123973	4844Y	0	70440266	35762168640214795	-569	82974					
SD0126	394610	1124145	4760U	0	64440320	35518168832214834	-1209	82620					
SD0127	394563	1124229	4703Y	0	65440236	35396168945214765	-1563	82462					
SD0128	394597	1124327	4655A	0	74440301	35257168655214815	-2356	81841					
SD0129	394616	1124444	4600B	0	93440340	35091168901214843	-2654	81750					
SD0130	395201	1124641	4724C	0	163441464	34831169461215740	-1824	82221					
SD0131	395226	1124794	4547C	0	163441519	34015170525215780	-2468	82187					
SD0132	395233	1124955	4729C	0	111441558	34390169757215809	-1550	82432					
SD0133	395085	1124943	4935H	0	120441269	34390169108215577	-1031	82258					
SD0134	395106	1124759	4657C	0	121441285	34053169989215593	-1778	82454					
SD0135	395149	1124568	4691C	0	149441336	34930169263215039	-2233	81917					
SD0136	395068	1124544	4614H	0	129441182	34965169449215516	-2653	81741					
SD0137	395007	1124702	4818C	0	112441090	34738168537215444	-1568	82112					
SD0138	394923	1124753	5208C	0	260440935	34662166138215313	-182	82322					
SD0140	394976	1124532	4587C	0	116441013	34980169609215381	-2608	81663					
SD0141	394864	1124521	4593S	0	114440800	34990169631215211	-2358	82091					
SD0003	40 211	1124787	4810S	0	201443300	34661171352217209	-593	83202					
SD0005	40 123	1124902	4640C	0	162443140	34494171804217074	-1610	82726					
SD0009	40 56	1124992	4554S	0	134443019	34363171891216979	-2233	82368					
SD0010	40 36	1124791	5076S	0	281442975	34649169254216949	73	83041					
SD0034	394616	1124823	5098S	32	460440350	34550160196214843	1602	81837					
SD0029	395510	1124510	6407S	40	732441995	35021158117216169	3190	81774					

## SEVIER DESERT, UTAH GRAVITY DATA

STATION	LAT.	LONG.	ELFV.	TER-FLR.	MNRTH	EAST	GRSV	THEC	FAA	CRA
IDFNT.	DEG	MIN	DEG	MIN	+CODE	IN/OUT	UTM	UTM	GRAV	GRAV
										+1000
SD0041	395434	1124030	7054S	17	966441841	35710154430216050	4766	81690		
SD0052	395224	1122830	6230Y	39	220441423	37414159328215745	2217	81227		
SD0055	394926	1122828	5710Y	5	140440872	37407162013215302	447	81117		
SD0060	394706	1122502	5577Y	12	111440457	37866162343214977	-148	80953		
SD0073	395038	1123237	5607Y	5	155441089	36828163751215469	1050	82080		
SD0085	394788	1123353	5442Y	12	126440629	36054164590215098	706	82283		
SD0209	394433	1123434	5407Y	7	157439974	36527165180214572	1493	83215		
SD0047	395629	1123294	6654S	38	413442183	36765156936216345	3216	80972		
SD0051	395445	1122992	6507S	5	370441836	37190157350216073	2519	80700		
SD0123	394668	1123859	5538S	163	415440420	35928163882214920	1681	82770		
SD0218	393694	1124815	5278V	41	168438044	34527164141213477	534	82541		
SD0302	393398	1122641	4930V	33	70438041	37629168032213039	1393	84681		
SD0004	40 121	1124703	5450S	20	773443131	34777167092217070	1305	83510		
SD0007	40 125	1125243	4506C	0	73443154	34009173366217081	-1314	83391		
SD0014	395875	1125101	4565S	0	104442687	34201172115216710	-1638	82890		
SD0042	394689	1123562	6480V	922520440451	36353157007214952	3043	83554			
SD0043	394558	1123379	5914S	941014440204	36610161402214757	2304	83241			
SD0159	394250	1124730	47438	0	64439671	34669167812214301	-1855	82032		
SD0173	394002	1124561	51710	44	384439207	34902165654213934	386	83178		
SD0200	394125	1123504	46820	0	55439406	36417168885214116	-1170	82916		
SD0203	394374	1123484	4953Y	0	122439860	36454167960214484	87	83315		
SD0216	394098	1122875	48375	0	60439341	37315168490214076	-67	83495		
SD0218	393694	1124815	5278V	82	464438044	34527164141213477	334	82878		
SD0279	393750	1122991	4753C	0	484438700	37139168814213560	-18	83819		
SD0309	393754	1122346	5702V	941245438693	38061162566213566	2663	84554			
1097	395473	112467152192T		0	220441931	34799166694216114	-320	82100		
U181	395102	112467746299T		0	123441245	34776170311215564	-1700	82633		
U182	394902	112458346578T		0	110440872	34903169836215267	-1600	82620		
3193	394158	112451446257T		0	62439494	34975169497214165	-1140	83142		
U263	394063	112472247119T		0	61439324	34674167948214024	-1740	82251		
U260	393438	112454945830T		0	52438163	34898168427213099	-1560	82862		
U259	393242	112464845738T		0	43437804	34750168363212808	-1410	83033		
U258	393062	112451345597T		0	37437467	34936167551212542	-2080	82397		
U279	392512	112458545709T		0	35436451	34813166586211729	-2130	82315		
U316	392250	112470245928T		0	34439970	34036166104211341	-2020	82344		
U193	394869	112529156299T		0	158440832	33900164506215219	2240	83218		
U192	394902	112524056299T		0	170440892	33960164926215267	2610	83600		
U188	394912	112491154869T		0	242440900	34435164696215282	1020	82572		
U191	395012	112520853478T		0	131441094	34016166412215431	1280	83191		
U187	395019	112483044757T		0	139441096	34544168096215441	-520	82539		
U206	395024	112597948560T		0	84441140	32910168744215448	-1010	82514		
U189	395080	112504051837T		0	129441215	34258166959215531	180	82649		

## SEvier Desert, Utah GRAVITY DATA

STATION	LAT.	LONG.	ELEV.	TFR-CUR.	NORTH	EAST	UBSV	THEC	FAA	ERA
IDENT.	DEG	MIN	DEG	MTN	+CLRF	TN/UTM	UTM	GRAV	GRAV	+1000
U190	395214	112526449498T	0	86441469	33944168431215730	-730	82466			
1607	395256	112540148809T	0	88441551	33750169063215792	-810	82626			
1096	395722	1125473	0	221442416	33666172629216484	-1210	83320			
1608	395875	1125101	0	222442687	34201172126216711	-1630	82800			
SD0150	394452	1125135	5367Y	0 118440056	34098164265214600	173	81986			
SD0151	394361	1125227	5201Y	0 90439890	33963164770214465	-749	81602			
SD0152	394306	1125144	5103Y	0 84439786	34080165090214384	-1270	81409			
SD0153	394343	1125029	5144Y	0 99439851	34246165441214438	-589	81965			
SD0161	394187	1125033	4924Y	0 66439563	34234165966214207	-1903	81366			
SD0162	394137	1125188	49408	0 63439475	34010165688214134	-1957	81257			
SD0163	394098	1125014	4859Y	0 59430398	34255166317214076	-2032	81454			
SD0169	394022	1125139	4847H	0 56430261	34075165286213963	-2064	81461			
SD0170	393899	1125127	4801H	0 52439033	34089166459213780	-2142	81535			
SD0176	393796	1125018	4829U	0 49438839	34241166753213628	-1431	82146			
SD0219	393571	1125118	4707U	0 48438426	34089167324213295	-1676	82318			
SD0221	393489	1125131	4670V	0 48438274	34067167591213173	-1636	82484			
SD0223	393402	1125018	4643U	0 54438110	34226167914213045	-1434	82774			
SD0012	395933	1125003	4620S	0 143442792	34345171464216797	-1857	82526			
SD0013	395970	1125117	4533S	0 98442864	34182172275216852	-1919	82718			
SD0021	395775	1125129	4559S	0 106442503	34158172513216562	-1147	83404			
SD0022	395688	1125016	4818S	0 116442339	34315170225216433	-870	82814			
SD0025	395576	1125160	4498S	0 123442136	34106171904216266	-2036	82746			
SD0026	395513	1125017	4489S	0 163442015	34307171461216173	-2472	82381			
SD0001	40 213	1125243	4511S	0 77443317	34012173898217213	-864	83827			
SD0002	40 213	1125013	4524S	0 102443310	34339172860217213	-1781	82491			
SD0006	40 124	1125129	4508S	0 88443149	34171172947217080	-1713	83000			
SD0008	40 40	1125243	4505C	0 76442997	34006172967216955	-1596	83115			
SD0158	394952	1125050	6260C	37 878441025	34240158984215376	2522	82086			
SD0037	395292	112513854901T	1	313441610	34120164792215845	613	82202			
SD0143	394747	1125044	7305V	181345440599	34239151514215038	5232	81681			
WW0026	392250	1125036	4575U	0 37435980	34156166256211341	-2031	82401			
WW0001	393315	1125131	4620U	0 51437953	34060168083212916	-1357	82937			
WW0002	393260	112482945919T	0	51437842	34491168321212834	-1302	83087			
WW0003	393242	1125032	4603U	0 50437815	34199168303212808	-1189	83161			
WW0004	393195	1124906	4588Y	0 44437724	34378168120212738	-1444	82952			
WW0005	393182	1125137	4596U	0 47437707	34047168270212720	-1198	83173			
WW0006	393141	1124793	4577U	0 40437621	34538167943212654	-1644	82783			
WW0007	393140	1125018	4592U	0 44437626	34216168325212657	-1121	83262			
WW0008	393053	1124906	4581U	0 40437461	34373167936212528	-1483	82932			
WW0009	393053	1125131	4592V	0 45437468	34050168165212528	-1150	83233			
WW0010	392967	1124793	4564U	0 38437294	34532167610212401	-1844	82626			
WW0011	392966	1125018	4585U	0 41437304	34209168046212400	-1207	83196			
WW0012	392879	1124906	4571U	0 39437139	34365167625212271	-1631	82818			
WW0013	392897	1125104	4626U	0 43437179	34083167757212296	-1008	82957			
WW0014	392792	1124810	4563V	0 38436976	34571167597212142	-1696	82774			
WW0015	392792	1125018	4586U	0 42436982	34203167549212142	-1437	82643			
WW0016	392685	1124922	4593U	0 40436781	34530167359211984	-1473	82472			

## SEVIER DESERT, UTAH GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	TER-ELR. +CODE	NORTH	EAST	UPSV	THEC	FAA	CRA
	MIN	MIN		UTM	UTM	UTM	UTM	GRAV	GRAV
								+1000	
WW0017	392672	1125051	4646U	0	69436761	34151166811211965	-1430	82792	
WW0018	392599	1124810	4573U	0	37436019	34494167265211857	-1558	82882	
WW0019	392598	1125035	4765U	0	56436623	34171165924211855	-1090	82714	
WW0020	392511	1124923	4584U	0	41436459	34328167012211727	-1577	82829	
WW0021	392510	1125146	4753U	0	49436464	34005165662211725	-1335	82503	
WW0022	392425	1124811	4564U	0	36436297	34486166734211599	-1917	82553	
WW0023	392424	1125036	4608U	0	42436302	34165166446211596	-1788	82537	
WW0024	392337	1124923	4578U	0	36436137	34322166516211470	-1872	82549	
WW0025	392251	1124811	4567V	0	35435975	34479166186211342	-2180	82279	
WW0027	392162	1124925	4561U	0	35435814	34312166411211211	-1679	82600	
WW0028	392161	1125150	4563U	0	39435818	33989166041211209	-2228	82248	
WW0029	392074	1124812	4570U	0	34435648	34471166072211680	-2004	82444	
WW0030	392074	1125038	4558U	0	36435654	34147166176211080	-2011	82479	
WW0031	391986	1124925	4561U	0	33439488	34306166371210951	-1659	82818	
WW0032	391988	1125156	4552U	0	36435499	33974166162210954	-1954	82556	
WW0033	391898	1124812	4564U	0	33435322	34465166227210820	-1644	82822	
WW0034	391900	112501845551T		0	34435332	341691660338210823	-1619	82879	
WW0035	391810	1124926	4555U	0	33435133	34298166270210691	-1555	82442	
WW0036	391811	1125151	4551U	0	35435171	33974166379210692	-1488	83026	
WW0037	391722	1124813	4555U	0	33434997	34457165985210560	-1710	82787	
WW0038	391723	1125038	4557U	0	33435005	34134166211210562	-1466	83024	
WW0039	391630	1124925	4554U	0	33434841	34293165939210434	-1640	82861	
WW0040	391630	1125145	4559V	0	34434837	33970166205210434	-1327	83157	
WW0041	391564	1124847	4566U	0	33434705	34402165817210327	-1542	82918	
WW0042	391549	1125040	4552U	0	33434683	34124166152210305	-1317	83190	
WW0043	391811	1125825	4605U	0	43435192	33006164825210692	-1969	82163	
WW0044	391812	1125600	4588U	0	39435186	33329165027210694	-2492	81899	
WW0045	391812	1125390	4561U	0	36435180	33631165940210694	-1832	82648	
WW0046	391719	1125712	4640U	0	39435018	33165164735210556	-2156	82057	
WW0047	391725	1125488	4563U	0	37435022	33487165557210565	-2068	82406	
WW0048	391724	1125263	4550U	0	35435013	33810166242210563	-1504	83013	
WW0049	391629	1125824	4651U	0	40434855	33000164603210423	-2052	82125	
WW0050	391632	1125600	4578U	0	38434853	33322164966210427	-2380	82044	
WW0051	391655	1125343455561T		0	35434888	33693166008210462	-1580	82916	
WW0052	391545	1125712	4600U	0	38434696	33158164656210294	-2355	81494	
WW0053	391550	1125489	4566U	0	36434648	33478165707210306	-1631	82821	
WW0054	391550	1125264	4551V	0	34434692	3302166168210306	-1312	83201	
U318	391519	112535345548T		0	34434637	33673165964210261	-1460	83054	
U317	391698	112504545518T		0	33434959	34123166183210525	-1510	82993	
2374	391905	112481345545T		0	33435335	34464166324210831	-1650	82843	
2373	391907	112549746102T		0	39435369	33481165045210834	-2410	81494	
U278	392603	112479045716T		0	37436026	34523167272211863	-1570	82877	
2477	392700	112517246844T		0	52436816	33978166498212007	-1430	82642	
U280	392752	112542847789T		0	54436920	33013165777212083	-1340	82414	
U281	392828	112579551368T		0	84437072	33090164463212196	510	83094	
2478	392846	112581050955T		0	99437106	33069164535212223	240	82979	

## SEVIER DESERT, UTAH GRAVITY DATA

STATION IDENT.	LAT. DFG MIN	LONG. DFG MIN	TER-COR. +CODE	NORTH TN/UTM	EAST UTM	DHSV UTM	THEC GRAV	FAA GRAV	CRA +1000
U276	392847	112522145899T	0	46437089	33914167193212224	-1850	82548		
U282	392911	112596153130T	0	105437231	32855163533212319	1180	83175		
U275	393077	112537246647T	0	60437519	33706166954212564	-1720	82430		
U274	393308	112552847057T	0	100437952	33492167138212906	-1490	82550		
U268	393312	112492046388T	0	47437941	34363168308212912	-960	83267		
U273	393452	112562148248T	0	109438221	33364166592213119	-1130	82519		
U272	393589	112595052349T	0	113438484	32899164162213322	70	82353		
U267	393603	112513347178T	0	48438485	34069167330213343	-1020	82328		
U270	393700	112581150079T	0	81438685	33102165529213486	-840	82161		
U269	393754	112573649318T	0	69438783	33212165972213566	-1190	82059		
U271	393842	112593950220T	0	76438952	32925164689213097	-1760	81186		
U265	393866	112553048540T	0	65438984	33511166352213732	-1710	81795		
U266	393934	112521748150T	0	53439100	33461166223213833	-2310	81323		
U264	394012	112498747910T	0	55439238	34293166647213949	-2220	81485		
U207	394121	112594349380T	0	71439468	32931165450214110	-2200	81031		
U199	394181	112547350089T	0	125439565	33605165465214199	-1610	81475		
U200	394193	112565650748T	0	90439593	33344165866214217	-600	82180		
U196	394249	112527150597T	0	82439684	33896165146214300	-1550	81282		
U198	394351	112505050919T	0	95439867	34216165464214451	-1080	81645		
U197	394422	112485150659T	0	139439992	34503165953214556	-940	81919		
U201	394427	112568554508T	0	119440026	33312164162214563	860	82409		
U203	394506	112587451870T	0	84440178	33045164668214680	-1010	81384		
U194	394617	112526856358T	0	146440365	33915163112214845	1270	82210		
U204	394699	112576154318T	0	114440532	33214164292214967	410	82024		
U185	394722	112466149600T	0	138440542	34785167420215001	-410	82808		
U285	394862	112573952549T	0	126440833	33252165971215208	190	82406		
DW0218	393582	1125959 5248Y	0	116438472	32886164189213312	247	82471		
DW0219	393576	1125709 4927Y	0	91438453	33243165862213302	-1074	82212		
DW0220	393473	1125837 5386Y	0	227438266	33056163470213150	1008	82865		
DW0221	393378	1125770 5410Y	0	276438089	33148163272213009	1176	83076		
DW0223	393261	1125766 5330R	0	349437872	33149163925212836	1249	83419		
DW0225	393077	1125721 5345Y	0	266437570	33206163472212564	1209	83245		
DW0226	393094	1125565 4805H	0	101437557	33430166221212589	-1149	82563		
DW0227	393200	1125647 4880H	0	168437755	33517166220212746	-603	82921		
DW0228	393268	1125503 4682Y	0	90437877	33526167304212847	-1483	82639		
DW0229	393323	1125636 4830H	0	149437983	33538166470212928	-1005	82670		
DW0230	393443	1125620 4790Y	0	113438204	33365165600213105	-1429	82347		
DW0231	393549	1125540 4795H	0	71438398	33484166573213263	-1567	82150		
DW0232	393623	112544547779T	0	60438532	33023166429213372	-1974	81784		
DW0233	393671	112555248159T	0	65438624	33472166285213443	-1837	81402		
DW0234	393713	112565048750T	0	67438704	33333166067213505	-1562	81878		
DW0235	393738	1125495 4812H	0	57438746	33546166277213542	-1982	81663		
DW0236	393692	1125347 4767H	0	57438050	33766166494213474	-2120	81678		
DW0237	393445	112525347090T	0	51438382	33895167243213256	-1706	82290		
DW0238	393515	1125385 4741Y	0	59438330	33705167091213213	-1506	82382		
DW0239	393421	1125281 4662H	0	52438153	33850167648213073	-1503	82644H		

## SEVIER DESERT, UTAH GRAVITY DATA

STATION	LAT.	LONG.	ELEV.	TER-COR.	NORTH	EAST	OBSV	THEC	FAA	CHA
IDENT.	Deg	Min	Sec	CODE	IN/OUT	UTM	UTM	GRAV	GRAV	+1000

DW0240	393411	1125467	4715H	0	67438140	33583107378213058	-1311	82675		
DW0241	393316	1125355	4636H	0	60437961	33740168299212918	-1032	83216		
DW0242	393210	1125293	4615H	0	55437763	33824168160212761	-1170	83144		
DW0243	393173	1125444	4677Y	0	69437699	33607167226212706	-1467	82650		
DW0244	393088	1125386	4685H	0	64437540	33686167013212580	-1479	82605		
DW0245	393081	1125282	4627H	0	52437524	33835167809212570	-1218	83052		
DW0246	393014	1125445	4758H	0	74437405	33599166321212470	-1375	82471		
DW0247	393002	1125331	4672Y	0	58437380	33762166957212453	-1530	82593		
DW0248	393660	1125192	4746U	0	52438593	33986167024213427	-1741	82124		
DW0249	392948	1125195	4621U	0	46437276	33955167639212373	-1249	83036		
DW0250	392878	1125243	4657U	0	50437147	33883167119212270	-1327	82840		
DW0251	392792	1125148	4630U	0	44436986	34016167152212142	-1420	82832		
DW0252	392703	1125224	4674U	0	49436823	33904166556212011	-1470	82638		
DW0253	392604	1125139	5102U	0	136436638	34022163525211864	-325	82409		
DW0254	392337	1125148	4596V	0	42436144	33999166152211470	-2064	82303		
DW0255	392598	1125259	4768Y	0	53436630	338501665529211855	-1476	82522		
DW0256	392423	1125259	4738Y	0	45436306	33843165481211597	-1547	82345		
DW0257	392336	1125372	4633C	0	64436149	33677165743211468	-2126	82136		
DW0258	392423	1125483	4744H	0	54436313	33521165249211597	-1703	82170		
DW0259	392510	1125371	4741Y	0	66436471	33645165543211725	-1567	82324		
DW0260	392597	1125483	4800Y	0	57436035	33528165329211854	-1354	82332		
DW0261	392684	1125372	4740Y	0	52436792	33691165866211983	-1511	82374		
DW0262	392762	1125507	4825Y	0	60436941	33500165477212098	-1213	82391		
DW0263	392792	1125354	4707Y	0	52436992	33721166368212142	-1481	82517		
DW0264	392879	1125355	4699Y	0	53437153	33723166522212271	-1529	82407		
DW0265	392900	1125491	4805Y	0	62437196	33529165846212302	-1190	82484		
DW0267	392893	1125683	5008Y	0	85437189	33253165077212291	-86	82914		
DW0268	392878	1125578	4895Y	0	73437158	33405165380212270	-824	82553		
DW0269	392785	1125613	4931Y	0	67436987	33349164030212132	-1698	81550		
DW0270	392719	1125699	5005Y	0	68436867	33223164773212034	-160	82837		
DW0271	392646	1125571	4890Y	0	60436728	33404165052211927	-657	82525		
DW0272	392597	1125707	5002C	0	67436642	33207164543211854	-239	82768		
DW0273	392510	1125595	4868Y	0	60436477	33364165008211725	-906	82550		
DW0274	392449	1125716	4954Y	0	67436368	33188164643211635	-372	82798		
DW0275	392379	1125754	5021Y	0	75436240	33131164036211531	-244	82706		
DW0276	392336	1125595	4780H	0	58436156	33351165039211468	-1445	82309		
DW0277	392261	1125726	4881U	0	69436021	33166164734211357	-690	82732		
DW0278	392296	1125855	57359T	0	436436091	32942158753211409	1327	82199		
DW0279	392423	1125932	54859T	0	127436327	32877160930211597	962	82378		
DW0280	392510	1125819	5160C	0	81436484	33043163290211725	125	82604		
DW0281	392595	1125878	5145Y	0	85436643	32961163587211851	149	82686		
DW0283	392684	1125819	5092Y	0	75436800	33050164121211983	58	82766		
DW0284	392762	1125903	5170Y	0	80436953	32932163836212098	392	82818		
DW0285	392835	1125803	5141C	0	85437085	33079164401212205	576	83127		
DW0286	392897	1125940	5292Y	0	100437204	32885163632212298	1137	83188		
DW0287	392956	1125745	5087Y	0	118437307	33167165039212385	523	83206		
DW0288	392998	1125851	5497Y	0	182437388	33017162544212407	1829	83263		

## SEVIER DESERT, UTAH GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	TER-CUR. +COPR	NORTH	EAST	DESV	THEC	FAA	CHA
	MIN	MIN		IN/OUT	UTM	UTM	GRAV	GRAV	+1000
DW0295	392160	1125824487601	0	66435837	33021164303211208	-1019	82417		
DW0296	392072	1125712 4688S	0	53435671	33179165033211077	-1929	82135		
DW0297	391985	1125824 4714U	0	50435513	33014164593210949	-1905	81977		
DW0298	391900	1125712 4622S	0	43435353	33172165026210823	-2302	81976		
DW0299	391899	1125488 4566V	0	39435344	33494165409210822	-2441	82025		
DW0300	391985	1125600 4584U	0	43435506	33336165300210949	-2512	81896		
DW0301	392073	1125487 4574U	0	44435666	33502165742211079	-2293	82150		
DW0302	392160	1125600 46791T	0	53435830	33543165519211208	-1657	82438		
DW0304	392249	1125259 4567S	0	51435984	33836166076211339	-2285	82188		
DW0304	392249	1125259 4567S	0	51435984	33836166076211339	-2285	82189		
DW0305	392161	1125372 4562S	0	48435825	33670165836211209	-2443	82045		
DW0306	392074	1125262 4558S	0	39435661	33825165931211080	-2257	82236		
DW0307	391986	1125374 4555U	0	39435501	33661165958210951	-2128	82376		
DW0308	391898	1125260 45508T	0	36435335	33821166057210820	-1937	82577		
DW0309	395868	1125395 4508R	0	68442683	33783172725216700	-1552	83179		
DW0027	395949	1125242 4511S	0	78442829	34004173087216820	-1282	83409		
DW0028	395863	1125241 4536S	0	80442669	34002173009216693	-1002	83607		
DW0030	395762	1125348 4410U	0	102442486	33845173364216543	-1680	83381		
DW0031	395526	1125277 5103S	0	174442047	33937168233216193	63	82832		
DW0034	395600	1125465 4546S	0	86442190	33672172146216302	-1378	83203		
DW0035	395799	1125529 4475U	0	65442560	33589173262216598	-1224	83577		
DW0036	395888	1125540 4413U	0	63442725	33577173791216730	-1412	83600		
DW0037	395951	1125468 4509U	0	63442830	33682172958216823	-1436	83249		
DW0038	395951	1125692 4393U	0	57442846	33303173907216823	-1577	83497		
DW0039	395778	1125692 4509U	0	57442520	33356172559216566	-1579	83100		
DW0040	395690	1125580 4512U	0	64442360	33512172617216436	-1359	83316		
DW0041	395596	1125692 4523U	0	64442189	33349172295216296	-1438	83200		
DW0042	395516	1125577 4554S	0	69442038	33509171971216178	-1351	83185		
DW0043	395428	1125691 4572U	0	66441878	33344171292216047	-1729	82742		
DW0044	395316	1125633 4667U	0	74441664	33422170529215881	-1434	82723		
DW0045	395316	1125803 4608U	0	69441675	33179170477215881	-2041	82311		
DW0046	395430	1125918 4543U	0	64441889	33020171354216056	-1945	82624		
DW0047	395516	1125806 4530U	0	63442045	33183171902216178	-1646	82966		
DW0048	395604	1125918 4509U	0	60442211	33027171931216309	-1445	82730		
DW0049	395690	1125806 4511U	0	58442367	33190172389216436	-1596	83075		
DW0050	395778	1125919 4501U	0	56442533	33033172332216566	-1879	82425		
DW0051	395866	1125805 4492S	0	55442692	33199172798216697	-1627	83107		
DW0052	395951	1125916 4483U	0	53442853	33045172955216823	-1683	83080		
DW0109	395235	1125882 4645R	0	72441527	33063170027215761	-2023	82206		
DW0110	395141	1125917 4722R	0	75441355	33010169333215622	-1849	82119		
DW0111	395007	1125759 4977R	0	98441102	33230167877215423	-706	82415		
DW0114	394821	1125972 5149Y	0	92440764	32910166263215147	-429	82102		
DW0115	394730	1125872 5262Y	0	101440593	33057165101215012	-390	81763		
DW0116	394652	1125745 5548Y	0	144440444	33235163576214896	891	82112		
DW0117	394598	1125924 5167Y	0	82440350	32977165192214816	-999	81459		
DW0125	394972	1125330 5374Y	0	123441024	33840165989215371	1192	82986		
DW0126	395073	1125533 4986Y	0	109441217	33555168232215520	-369	82735		

## SEVIER DESERT, UTAH GRAVITY DATA

STATION	LAT.	LONG.	ELEV.	TER-COR.	NORTH	EAST	LHSV	THEC	FAA	CRA	
IDENT.	DEG	MIN	DEG	MIN	+CODE	TN/OUT	UTM	UTM	GRAV	+1000	
DW0127	39	51	23	112	57	12	4808Y	0	82441315	33301168884215595	-1465 82218
DW0128	39	52	28	112	57	24	4692H	0	73441509	33288169708215751	-1833 82239
DW0129	39	51	16	112	55	78	4803Y	0	81441427	33495169488215688	-1000 82698
DW0131	39	50	06	112	55	27	5208Y	0	106441233	33920166722215540	194 82577
DW0132	39	52	08	112	56	61	4977H	0	84441458	33948168363215721	-514 82589
DW0133	39	51	35	112	51	75	4782Y	0	51438842	34016166568213627	-2056 81685
DW0135	39	43	60	112	53	45	42470T	0	100439892	33782164582214464	-503 81701
DW0136	39	42	62	112	53	97	5126R	0	91439712	33717165285214319	-795 81613
DW0137	39	42	29	112	53	04	50561T	0	78439648	33848165259214270	-1430 81403
DW0138	39	41	33	112	53	44	4981H	0	69439472	33787165722214127	-1531 81549
DW0139	39	40	16	112	52	95	4870H	0	59439254	33853166138213954	-1987 81462
DW0140	39	39	54	112	54	27	5001Y	0	69439143	33662165390213863	-1409 81603
DW0141	39	39	07	112	54	85	4825H	0	53439052	33863166208213793	-2178 81418
DW0142	39	37	89	112	53	25	4786Y	0	55438835	33801166496213618	-2122 81609
DW0143	39	38	37	112	54	66	48379T	0	57438928	33001166170213689	-1991 81565
DW0144	39	38	88	112	55	61	5055Y	0	82439622	33467165160213768	-1031 81610
DW0146	39	40	54	112	54	57	4980H	0	67439329	33023165960214010	-1188 81894
DW0147	39	40	55	112	55	78	5277Y	0	105439335	33450163968214012	-583 81724
DW0148	39	41	85	112	54	85	51352T	0	89439573	33588165591214205	-289 82286
DW0149	39	41	90	112	55	75	51991T	0	82439584	3345165659214212	375 82725
DW0150	39	42	95	112	56	26	5385Y	0	134439780	33391164537214367	849 82616
DW0152	39	44	64	112	54	28	55951T	0	126440087	33680162953214618	990 82073
DW0153	39	43	82	112	57	09	5466Y	0	115439444	33270163872214490	816 82286
DW0154	39	42	73	112	57	49	5138H	0	87439743	33214165208214335	-714 81849
DW0155	39	41	86	112	56	91	51050T	0	80439581	33294165881214206	-283 82385
DW0156	39	41	65	112	57	77	5950259T	0	71439545	33167165654214175	-1223 81706
DW0157	39	40	56	112	57	66	4970Y	0	67439343	33181165943214013	-1299 81810
DW0158	39	40	55	112	56	82	5051Y	0	73439338	33301166108214012	-376 82475
DW0159	39	39	36	112	57	91	4924H	0	65439121	33140165818213636	-1678 81592
DW0160	39	39	60	112	56	68	4980Y	0	66439162	33317166029213671	-977 82104
DW0161	39	38	22	112	56	99	4885Y	0	65438908	33267166249213666	-1447 81957
DW0162	39	37	94	112	58	48	49639T	0	74438660	33053165414213625	-1496 81647
DW0163	39	37	52	112	57	42	4932H	0	69438779	33203165982213563	-1166 82081
DW0164	39	39	24	112	59	15	4982H	0	67439103	32963165116213818	-1819 81256
DW0165	39	40	54	112	59	16	4980C	0	65439344	32967165162214010	-2096 81024
DW0166	39	41	38	112	58	88	549731T	0	67439498	33017165490214135	-1686 81220
DW0167	39	42	45	112	59	48	5007H	0	73439698	32924165251214293	-1924 81072
DW0168	39	42	97	112	58	61	5083Y	0	78439791	33055165244214370	-1292 81649
DW0169	39	43	97	112	58	82	51468	0	90439477	33029165085214519	-1006 81532
DW0170	39	44	94	112	58	47	5258Y	0	85440155	33083164753214663	-427 81724
DW0217	39	36	63	112	58	02	50239T	0	83438617	33114165622213431	-530 82417
DW0019	40	39	11	112	58	05	4435U	0	53443012	33206173803216954	-1416 83516
DW0020	40	21	4	112	58	06	4459U	0	55443330	33212174239217214	-1015 83432
DW0022	40	37	11	112	55	80	4515U	0	64443002	33526175372216951	-1091 83573
DW0023	40	21	2	112	55	80	4475U	0	55443325	33533173836217211	-1263 83429
DW0025	40	38	11	112	53	55	4504U	0	66442997	33846173168216952	-1404 83301
DW0026	40	21	4	112	53	55	4499U	0	65443322	33853173687217214	-1190 83530

## SEVIER DESERT, UTAH GRAVITY DATA

STATION IDENT.	LAT. DEG	LONG. MIN	TER-CUR. SEC	NORTH MIN	EAST SEC	PRSV IN/OUT	THEF UTM	FAA UTM	GRAV GRAV	ERA +1000
DW0018	40	126	1125918	44570	4	52443177	33049173837217083	-1305	83549	
DW0145	393974	1125585	5351Y	25	1714391A5	33437103711213892	176	82121		
DW0216	393699	1125960	5227Y	18	4043A6H8	32889163846213484	-448	81829		
DW0113	394856	1125708	5595Y	33	178440821	33296164008215199	1465	82593		
DW0118	394586	1125672	5910Y	123	62440320	33337161184214798	122	H0932		
DW0120	394679	1125473	6345Y	120	304440486	33025158482214937	3262	82111		
DW0130	395158	1125426	5288Y	4	206441371	33710166418215647	534	82708		
DW0123	394867	1125538	5830Y	21	235440830	33539162426215215	2078	82450		
DW0124	394982	1125611	5334Y	18	149441051	33440165739215386	550	82525		
DW0021	40	125	1125692	4470U	0	126443166	33370173817217081	-1199	83680	
DW0024	40	125	1125466	4494U	0	60443161	33092173006217081	-1185	83547	
DW0029	395687	1125240	4413S	0	149442344	33996172896216431	-2008	83089		
DW0033	395438	1125444	4706H	0	86441889	33696170780216062	-996	83039		
DW0112	394924	1125874	5410Y	52	501440952	33062164470215300	84	82185		
DW0134	394436	1125279	5273Y	0	102440031	33892164580214577	-369	81748		
DW0151	394313	1125505	5484Y	0	142439810	33564163713214394	429	82367		
DW0222	393368	1125916	7208S	80	3307438075	32938150050212995	5746	8424M		
DW0224	393179	1125871	7045V	1083073437724	32995151885212715	5478	84630			
DW0266	392980	1125825	4963Y	0	97437348	33340165552212420	-164	83006		
DW0282	392686	1125983	5308Y	0	102436815	32815162791211985	739	82744		
DW0303	392250	1125483464H9T		0	53435993	33515165500211341	-2091	82105		

